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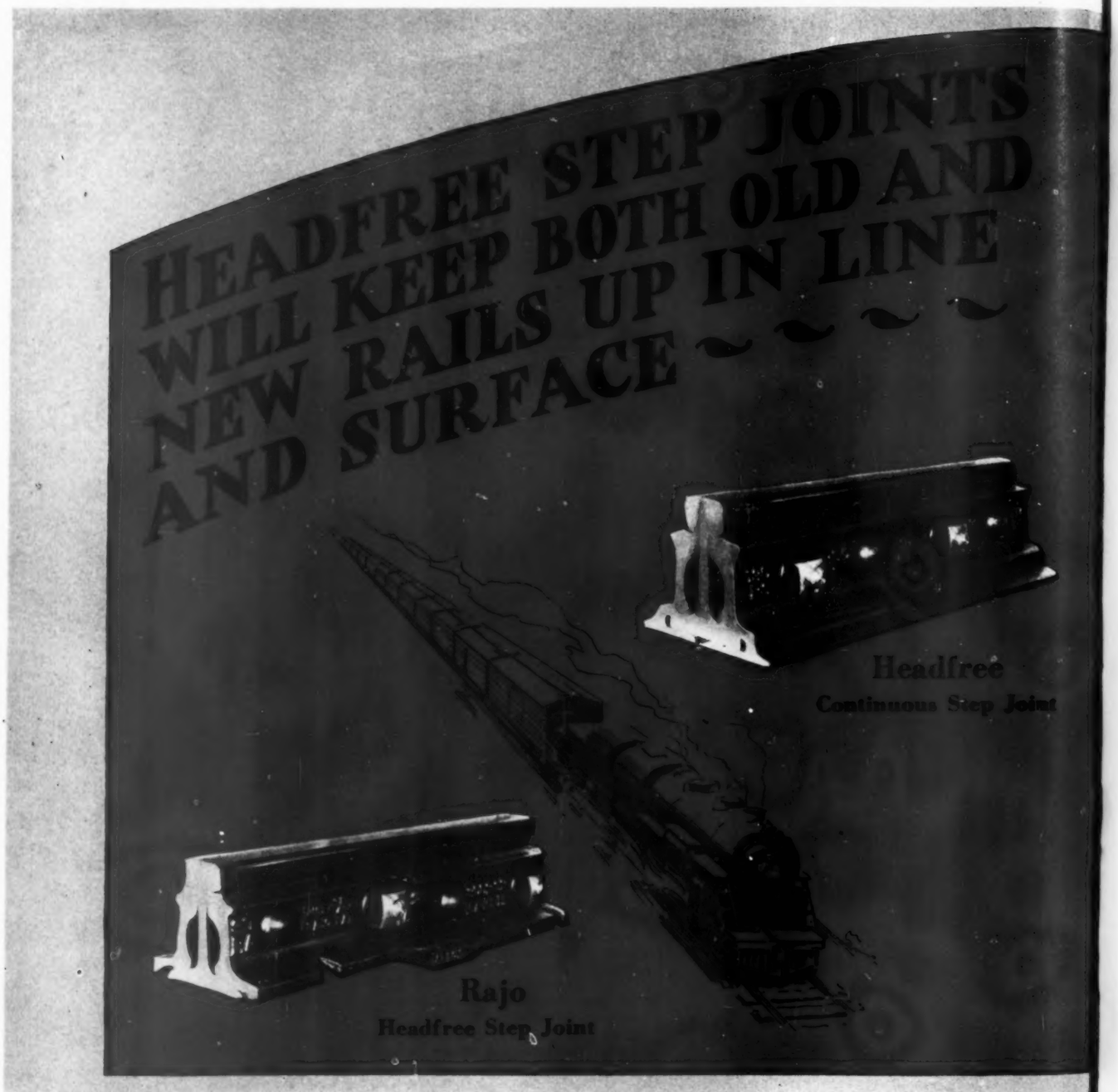

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Railway Age

Vol. 88, No. 1 January 4, 1930

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Railway Developments in 1929 and Prospects For 1930

BY THE EDITOR

RAILWAY financial results were better in 1929 than in 1928, but more disappointing. Traffic and earnings were poor in the first two-thirds of 1928, but greatly improved in the last one-third of the year. Traffic and earnings were better in the first two-thirds of 1929 than in the corresponding part of any year since the war, but in the last one-third of the year declined so much that the hope that it would prove to be the railways' best year since the war was not realized. The incomplete statistics available indicate that the percentage earned on property investment by the Class I roads was slightly less than in 1926, although larger than in any other year since the war. The western roads earned the best return since the war. The eastern roads did just about as well as in 1926. The southern roads fared no better than in 1928, and worse than in any other year since 1922. Even with a substantial amount of back mail pay in their earnings, the roads as a whole probably will report for the year a net operating income of less than 5 per cent on property investment.

Trend of Freight Business

FREIGHT business was larger than ever before, but its trend during the last one-third of the year was downward, and a decline in the latter part of a year almost invariably has been the forerunner of a reduced traffic in the first half of the next year. The trend of general business, upon which, of course, railway traffic depends, is, however, being determined to some extent at present by unprecedented influences.

The amount of grain shipped in the last three months of 1929 was the smallest since 1920. There is a vast amount of it in storage, which will have to move some time, and then its movement will increase railway earnings as much as the recent withholding of it has reduced them.

A new factor in general business is the concerted effort being made by business leaders, on the initiative of President Hoover, to maintain prosperity. This effort is being made because of the recent violent collapse of the stock market and apprehension that it would be followed by a decline of industrial expenditures that would cause unemployment, reduce the purchasing power of the consuming public and thereby depress all business. The effort to maintain employment, and thereby prosperity, is taking the form of the adoption by both private enterprise and public authorities of large programs of expenditures for improvements.

Maintaining Capital Expenditures

IF large programs of this kind are carried out, they will give the railways a great deal of freight business, and the tendency of railway business to decline may be arrested much sooner than in the past.

The railways were among the first industries called upon by the President to maintain or even increase their expenditures for improvements, and promptly endorsed his policy. A large amount of information regarding their plans, which is given in articles appearing elsewhere in this issue, indicates that they fully intend not only to maintain, but even to increase, their capital expenditures.

If they do it will be the first time in history that they have maintained capital expenditures in a period of declining earnings. Usually their expenditures for new equipment and other improvements have not only fluctuated in accordance with earnings, but even more in proportion. One important reason has been that there are many improvements which cannot be made without substantial charges to maintenance. Maintenance is an operating expense, and naturally there has been a desire to reduce all operating expenses when earnings have declined.

The new policy is an experiment the results of which

will be studied with great interest. Its success in the immediate future, from the standpoint of the railways, will depend not only on what they do, but also on what others do. If expenditures made by other industries and by governments are sufficient to prevent a large decline of traffic, the railways will have larger current earnings than they otherwise would have from which to pay larger operating expenses than they otherwise would incur. On the other hand, if there is a substantial decline of traffic, and the railways do not make a normal reduction of their maintenance expenses, the adverse effects of the new policy upon their net operating income will be substantial.

Need for Expansion Reduced

THE general industrial policy favored by President Hoover for such conditions as exist at present has largely influenced railway managements in deciding to maintain their expenditures for improvements. In doing so, however, they undoubtedly are also being influenced by special considerations affecting the situation of the railways themselves. As is pointed out by railway executives in an article elsewhere in this issue, and especially by L. A. Downs, president of the Illinois Central, there have been occurring changes in railroad conditions which have been altering the relative amounts of capital expenditures made for expansion and for economies in operation.

For many years the country constantly needed enlargements of railway facilities. There were extensive territories that needed new lines. Every new line opened was a feeder of new traffic to older lines, and traffic grew so fast that, as the railways were then operated, a large expansion of main lines and terminals was imperative, especially in the decade before the war.

The need for expansion by the construction of new lines is largely past. Since the war freight business has not grown as rapidly as before. This has been especially true of the more bulky traffic. The demands upon terminals have been reduced by the diversion of short haul traffic to motor trucks. Better co-operation between railways and shippers, and between railways themselves, in the distribution of cars, and the adoption of various improvements in operating methods by the individual lines, have resulted in increased efficiency in the utilization of facilities, and have produced many of the results formerly gained by actual expansion of facilities. There is in consequence at present no such need as formerly for increasing capacity.

Investing Capital to Reduce Operating Expenses

ON the other hand, there is greater need than ever for economies in operation, and for improvements which will help effect them. For almost a decade now the railways of the United States have had the unprecedented experience of seeing their total earnings tend to decline. They were smaller in both 1921 and 1922 than in 1920; in both 1924 and 1925 than in 1923; in both 1927 and 1928 than in 1926 or in 1923. Passenger business is constantly declining, freight business is not growing as formerly, and the tendency of rates is downward. In addition the average hourly wage has increased 10 per cent since 1923 and the tendency of taxes always is upward.

As long as they are subjected to these influences, all of which tend to reduce net operating income, they have only one means of salvation, and that is to effect operating economies. The most important means available for doing this is the investment of capital in improvements which will reduce the amount of labor, fuel and materials required.

What has been accomplished in curtailing operating expenses principally by means of such expenditures during the last six years is a token of what probably can be accomplished in future. Although a largely increased freight business was handled, operating expenses in 1929 probably were $400,000,000 less than in 1923; and this figure gives a very inadequate idea of the gigantic economies which have been accomplished since 1923 and which now probably approach $800,000,000 annually.

Huge Economies Already Effected

A COMPARISON of the operating statistics of 1923 and 1928 helps tell the story of what has been accomplished. Operating expenses, excepting for labor, of Class I roads, exclusive of switching and terminal companies, were about $315,000,000 less in 1928 than in 1923, and wages charged to operating expenses about $155,000,000 less. Meantime the average hourly wage increased from 61 cents to 65.6 cents. The number of hours of labor charged to operating expenses was reduced more than 615,000,000 hours, and at the average wage of 1928 this represented a saving of about $405,000,000 which, added to the reduction actually effected in other operating expenses, made a total of constructive savings due to operating economies of about $720,000,000 in 1928.

An increased volume of traffic was handled in 1929 with almost no increase of employees, and the constructive economies in that year as compared with 1923 undoubtedly were much larger than in 1928, although statistics are not available for showing just how much they were in 1929.

The effect of improvements made in American railways within recent years in reducing labor costs may be illustrated in another way. In 1920 investment per employee was $9,979 and the number of ton-miles of freight service rendered per employee was 221,115. In 1923 investment per employee was $11,707 and ton-mileage per employee was 245,596. In 1928 investment per employee was $15,232 and ton-mileage per employee

was 285,977. In 1929 investment per employee probably reached $16,000 and ton-mileage per employee about 300,000.

Obsolescence of Facilities

THE factor of obsolesence is one of importance in the plant of almost every old railway or manufacturing company. Experience has shown that in the absence of thorough investigation the amount of obsolete equipment, machinery and other facilities in service is almost sure to be underestimated. An obsolete locomotive, freight car, machine tool, or other piece of equipment or machinery is one which could be replaced by a new one the acquisition and use of which would reduce operating expenses more than it would increase charges on capital. From an economic standpoint, the physical condition of the thing has very little to do with the matter—its earning capacity everything. Measured by this standard, most railways and industrial concerns have large amounts of obsolete facilities.

The railways have better locomotives now than ever before; but it is not at all impossible that they actually have more obsolete locomotives than ever before, because the best locomotives installed within recent years are so much better than most of those previously in service that economies could be effected by retiring many of the latter. Many freight cars that are smaller or weaker than the average are obsolete because, although in good condition, their continued use makes transportation and maintenance expenses larger than they otherwise would be. Many shop tools are in good condition, but obsolete, because the saving in operating expenses that could be effected by installing new tools would be greater than the capital charges upon the investment in the latter.

Whether the decline of railway traffic is large or small, brief or protracted, it will be only a matter of time until traffic is larger than ever, and then the full effects of improvements made to effect economies will become apparent.

Mechanical Department Progress

THE outstanding railroad mechanical development during 1929 was the success achieved in improving equipment conditions with a minimum expenditure. The ratio of locomotive and car repair costs to total operating revenue was reduced so substantially on many roads as to reflect great credit on the managements. That this money was not saved at the cost of deferred maintenance is indicated by the excellent performance of equipment under more exacting service conditions. Schedules were shortened, train speeds and weights increased, and both cars and locomotives used more intensively than ever, with an actual decrease, on most roads, in the number of failures on a mileage basis.

Much of the saving in mechanical department expense was due to the continued retirement of obsolete, expensively-maintained equipment, and its replacement by effective modern units. In addition, there was further general extension of locomotive runs, closing of intermediate terminals and inefficient small repair shops, better programming of locomotive and car repair operations, and continued provision of improved facilities for handling this work in an economical way. Progress was made on a few roads in budgeting mechanical department expenses uniformly throughout the year and thus retaining a minimum stabilized force of careful, experienced and skilled men, whose morale was greatly improved by the practical assurance of steady employment under good working conditions. Additional developments along this line offer one of the most fertile fields for further improvement in mechanical department operations.

Locomotive Development

LOCOMOTIVE development followed closely along the lines adhered to in the past few years, of high sustained horsepower capacity at speeds, with large grate areas in the interests of efficient combustion and fuel economy. The use of large steel castings, including one-piece bed frames with integral cylinders, was apparently looked on with increased favor. A number of important locomotive details, such as crossheads, cylinder heads, wrist pins, knuckle joints, etc., were standardized as a result of the activities of the American Railway Association, Mechanical division. Positive pressure lubrication systems, as applied to locomotives, demonstrated both practicability and marked economy, not only by saving lubricants, but by facilitating long locomotive runs up to 1,000 miles without the necessity of stopping en route to apply lubricant to such parts as motion work, hub liners, engine truck bearings, etc.

Continued tests were made with oil- and distillate-electric locomotives, particularly for switching service. The past year also showed a notable preference for large tenders, these frequently being equipped with cast-steel water bottoms and designed to carry up to 22,000 gal. of water and 30 tons of coal. This permits operating locomotives long distances without stopping for fuel or water, or, if necessary, passing stations with an inferior water supply to take better water at other stations.

The trend in freight car construction during 1929 was distinctly toward higher capacity cars, a number of designs being developed for box cars, for example, in excess of 100,000 lb. capacity. Cars with special spherical or tubular steel containers were developed for handling gases safely under high pressure, one of these being designed to transport helium gas for the War

department. A new tank car design was projected, the feature of which was its unusually large capacity and the incorporation of the car frame and bottom course of the tank in a single steel casting. Still another new car was a mechanically-cooled refrigerator car equipped for strictly iceless operation.

The Trend in Car Construction

AN important act of the railroads in the interests of safety and economy was their legislation against the use of arch-bar trucks in new and rebuilt cars, and they considered a program of retirement of this type of truck in existing equipment in favor of trucks with cast steel side frames complying with the A. R. A. specifications.

The trend in passenger cars was toward a better class of all types of this equipment, with particular emphasis on comfortable seats, thermostatic temperature control, maximum convenience in toilet facilities, and interior decoration and equipment to satisfy the demands of the most fastidious traveling public. Self-propelled passenger equipment of the Diesel-, distillate-, or gasoline-electric type, continues to be acquired in units of increased size, capacity and power. The economic advantages of light construction in this as well as certain other types of equipment stimulated the use of light alloy sheets, conduits, etc. The coming year will doubtless witness extensive tests of this material for structural frame members, as a mill recently completed permits rolling the necessary large sections.

The important work of the Mechanical division during the year included the completion and publication of the results of the draft-gear tests at Purdue University, and the inauguration of road tests of air brake equipment on the Siskiyou line of the Southern Pacific.

A Record Year for Roadway

THE year which has just closed was an unusually active one for the roadway department. The expenditures for improvements in roadway and structures chargeable to capital account approximated $500,000,000, thereby probably exceeding the previous high record of $495,000,000 established in 1926. Likewise, the railways expended approximately $860,000,000 chargeable to operating expenses for the current maintenance of roadway facilities, or $16,000,000 more than in 1928. The total expenditures for roadway, chargeable to both capital and operating accounts, approximated $1,360,000,000, the largest amount ever expended for this purpose in any year.

The new mileage completed during 1929 showed a marked decline from 1928, although the expenditures upon it approached those of the previous year because of the fact that much of the mileage reported in 1928 was completed early in that year and the further fact that a larger mileage of new lines is now under construction than a year ago, while construction of a still larger mileage that is projected is awaiting favorable action by the Interstate Commerce Commission on applications that have already been filed with it. The expenditures for additional main tracks continue to decline because of the development of means for using existing facilities more intensively. In contrast, expenditures were made on an increasingly liberal scale for roadway improvements of a miscellaneous character, designed to improve service and increase operating economy.

Outstanding was the increase in appropriations made for the improvement of the track structure. The 85 and 90-lb. rail sections that were standard a few years ago gave way to 110 and 130-lb. sections more generally during the last year than heretofore. With this change has come the necessity for more and heavier tie plates, stronger joints, more rail anchors, better bolts and all of the accessories contributing to a stronger track construction.

The treatment of ties is rapidly becoming universal, while large expenditures continue to be made for ballast. During the last year added emphasis was placed on adequate drainage of the roadbed, the amount of ditching having increased rapidly, while the use of metal and other sub-drains became more general.

Use of Labor-Saving Equipment

OF equal interest is the increasing trend towards the use of labor-saving equipment of established as well as newer types. The amount devoted to such equipment during the last year reached a new high figure, a single road spending more than $1,000,000 for it. These expenditures are justified primarily by the reductions in labor costs that they effect. While time is required to permit the full influence of such expenditures to become evident, particularly in the face of steadily rising standards of maintenance, their influence is beginning to show itself on roads which have pioneered in the adoption of mechanical equipment. On one such road a reduction of nearly 40 per cent was made in the man-hours required for the current maintenance of the tracks and structures in 1929, as compared with a decade ago, no small part of which is attributable to the substitution of machines for hand labor.

Owing to the increasing expenditures for roadway purposes, and particularly for stronger track and structures, the condition of the fixed properties is better than ever before in history. This is making possible not only the operation of trains at faster speeds but, of equal importance, their operation with increased regularity. The results which have been secured afford an indication of the still greater results obtainable by a continuation of this program.

The liberal orders that have already been placed for rails for 1930 indicate that railway managements are

alive to the opportunity, and are planning to make even larger expenditures in this direction this year.

Signaling Progress Continued

THE construction of automatic block signals, interlockings, car retarders and highway crossing signals during 1929, in the United States and Canada, was greater than in 1928, and considerably more than the average of the past ten years, being in total volume practically equal to that of 1927, the previous peak year. Automatic signals were completed on 4,785 miles of road, as compared with 3,121 miles in 1928 and 5,127 in 1927. About 2,431 automatic highway crossing signals were installed, as compared with 2,254 in 1928. Ninety-nine new interlocking plants were constructed as compared with 86 in 1928, and 61 automatic plants were completed as compared with 40 for 1928. The combination of signaling and interlocking, including the application of power switch machines for the operation of passing track and junction switches, together with controlled signals for directing train movements, has shown a decided increase; more than 122 such installations, involving 582 levers of this type of interlocking being made during 1929, an increase of 269 levers over 1928.

Another important development in the signaling field was the completion of car retarders at 12 yards during 1929, which involved 12,228 rail feet of retarders, as compared with four such installations in 1928, involving 3,734 rail feet. The use of spring switches is also gaining favor, 135 such layouts being installed in 1929.

Among developments of significance were the extensive application of continuous cab signaling on the Pennsylvania, and several important installations of the centralized-dispatcher control system of operating switches and controlling the direction of train movements by signaling indication.

Motor Transport by Railways

GREATER progress was made in 1929 than in any previous year in the operation of motor coaches and motor trucks, tractors and trailers by the railways. There has been a substantial increase in the motor coach operations of the railways in each of the last five years, but never before such an increase as in 1929. Since 1925 the number of railways operating motor coaches has increased from 10 to 78, while the number of motor coaches operated by them has increased from 300 to 2,389. Similarly, motor vehicle operation for the transportation of freight by the railways became more general during 1929. Since 1925 there has been an increase from 15 to 55 in the number of railways using motor trucks, tractors and trailers in freight service, while the number of vehicles in use has increased from 900 since that date to 5,900 at the present time.

The most important trends during 1929, in connection with railway motor transport, were the establishment of several motor coach operations on a system-wide basis; the widespread absorption of independent motor coach lines by the motor coach operating subsidiaries of the railways; the establishment of long-distance motor coach services by the railways; the provision, through subsidiaries, of store-door collection and delivery of freight; and the establishment of more motor truck services by means of subsidiaries, rather than through contracts with outside trucking companies.

All states now regulate intrastate motor coach operators, and some states regulate motor truck operating companies, but the regulation of interstate operators has not yet been required by Congress. There is reason to believe, however, that Congress during its present session will enact legislation to this effect.

Greater Efficiency and Better Service

INCREASED efficiency in the utilization of equipment has been due not only to the acquisition of better equipment and to improved maintenance of it but, also, to the extensive improvements that have been made for some years in tracks, signaling and all other permanent structures. All previous records for efficiency in the use of equipment were surpassed in 1929. The average number of cars per freight train continued to increase, and in September for the first time exceeded 50 cars. The average miles traveled by each car daily increased, and in October reached the record figure of 36.3 miles. The speed of freight trains for the first time averaged 13 miles an hour in the entire year. Average tons per train exceeded 800 tons for the first time in history. Fuel consumption per 1,000 gross ton-miles was the smallest in history.

The year was also marked by unusual improvements in passenger service. The running time of the fastest trains between New York and Chicago was not reduced, but the number of trains covering the distance in 20 hours, the previous time of the Twentieth Century and the Broadway Limited, was trebled. Between most other large cities the schedules of passenger trains were reduced, the largest reductions being made between Chicago and the Pacific coast. In addition, numerous new trains were placed in service which provide a luxury surpassing any previously known. Travel in sleeping and parlor cars on through trains increased, but the efforts made to stop the decline of travel in day coaches continued for the most part to be unavailing.

O'Fallon Decision and Railway Stocks

AMONG the most important developments in the railway field last year were the decision of the United States Supreme court in the O'Fallon case, and the large fluctuations that occurred in the prices of railway stocks. The decision in the O'Fallon case settled that in a valuation of railways weight must be given to

the cost of reproduction. The decision was definitely favorable to the railways, as a valuation in which weight is given to cost of reproduction must be larger than one in which this factor would be practically disregarded, which was what the Interstate Commerce Commission proposed to do.

When the decision was rendered the prices of industrial, public utility and railroad stocks had been advancing for almost six years, although the prices of industrial and public utility stocks had advanced much more than those of railroad stocks. The highest average of twenty representative railroad stocks reported by Dow-Jones in 1923 was 90.63; in 1924, 96.53; in 1925, 112.93; in 1926, 123.33; in 1927, 144.82, and in 1928, 152.70. The highest level reached in any earlier year was in 1906, when the maximum was 138.36. It will be seen that the rise went on almost regardless of fluctuations in railway earnings between 1923 and 1928; and it was much greater in proportion than the increase in the return earned by the railways.

In May, 1929, when the O'Fallon decision was rendered, the Dow-Jones average of railroad stocks was 153.95. Already the stock market was beginning to show signs of flagging energy, but the O'Fallon decision apparently made many speculators believe the sky had been made the limit of railroad earnings. The Dow-Jones average of railroad stocks ascended until on September 3, 1929, it reached the record figure of 189.11. Soon afterward came the stock market collapse, and, like those of other stocks, the prices of railway stocks declined perpendicularly until on November 13, 1929, the Dow-Jones average was only 128.07. Since then there has been some recovery and on December 18 the Dow-Jones average was 148.95.

Stock Prices and Dividends

INFLATED prices of their stocks are unfortunate for the railways because they give an exaggerated impression regarding their earnings, and are not a true indication of the cost at which they can actually raise capital by selling stocks. The increase in the net income of the railways since 1923, and the consequent increase in the dividends paid by them, have, however, afforded a real investment reason for a substantial part of the increase in the prices of their stocks. The cash dividend payments of Class I railways in 1923 were $296,000,000; in 1924, $320,500,000; in 1925, $342,000,000; in 1926, $399,000,000; in 1927, $411,600,000, and in 1928, $431,000,000. In 1929 several important railways increased their rates of dividend, including the Baltimore & Ohio, 6 to 7 per cent; the Rock Island, 6 to 7 per cent; the New Haven, 4 to 6 per cent; the Pennsylvania, 7 to 8 per cent, and the St. Louis-San Francisco, 7 to 8 per cent. The Erie also began paying 4 per cent on its preferred stock for the first time since 1907, and the Boston & Maine resumed the payment of 6 per cent on its preferred stock. In consequence, the total dividend payments reported for 1929 will be the largest in railroad history.

The ability of the railways to increase their dividends is due as much to conservative financing as to increase in the rate of return earned by them on property investment. Their net income upon stock has increased relatively more than their return on investment because, year after year, they have been investing earnings which have not been capitalized.

The State of Public Sentiment

THE railways have entered the year 1930 with public sentiment remarkably favorable to them. The evidences of this are numerous. The *Railway Age* recently sent a questionnaire to the heads of large business concerns throughout the country asking for information regarding ways in which their concerns have benefited by the improvements made in railway service within recent years. The replies received, which will be summarized and quoted in articles in future issues of the *Railway Age*, contain the most striking and conclusive evidence ever assembled regarding the benefits derived by general business from good transportation service. Furthermore, the tone of most of the letters is such as to show that their writers fully appreciate the achievement of the railways and are glad to pay generous tribute to it.

In past years when railway net operating income substantially increased there usually was an outcry that the railways were making too much money and that their rates ought to be reduced. In the first two-thirds of 1929 the railways earned net return at a higher rate than in any year since 1916, and prices of their stocks advanced to an unprecedented level, but there was very little comment to the effect that they were earning too much or demand for reduction of their rates.

President Hoover's appeal to the railways to maintain or even increase their improvement programs in the face of declining business in one way affords protection to them, because the national government cannot consistently ask them to spend more and at the same time deliberately so regulate them as to reduce their earnings.

In past periods of threatened or real recession in business, demands have been made for reductions of railway rates to help business. There is a difference between asking that railway rates shall be reduced to help business, and asking that railway expenditures shall be maintained or increased to help business, which indicates a significant change in the view of leaders of public thought as to the part that railways should and do play in modern industry and commerce.

It is doubtful if there ever has been a time since the early history of railroading in this country when the attitude of the public toward the railways was more friendly than it is now, or when it was more disposed to have them treated fairly.

Railways' Contribution to American Prosperity

Results of program of improvements adopted in 1923—Response to President Hoover's request to maintain expenditures will have far-reaching effects

By HON. ROBERT P. LAMONT
Secretary of Commerce

PROSPEROUS railways indicate a prosperous United States. This impressive truth is realized far more today than ever before.

A comprehensive, constructive and concerted program was agreed upon in 1923 by the chief executives of the railways "to insure to the highest degree practicable adequate provision for the country's transportation requirements."

That this program was not a sporadic and temporary policy the people of the country now know. The movement started in 1923 has been continued progressively, gaining momentum and vitality with the passing years. Every demand for transportation by manufacturers, farmers and other shippers has been met.

Billions of dollars have been invested in our railways since 1923. Late in 1929 the railways have come forward again with a large program of improvements. They enjoy to a high degree the confidence of the public, for this confidence is based upon experience. In their recent conference with President Hoover the railway managers again envisioned a billion dollar investment in our transportation arteries for 1930. The American railways are rehabilitated, but they are building for the future.

In passing it is interesting to note that the then Secretary of Commerce, now President, appearing before the Interstate Commerce Commission as early as February, 1922, struck at the heart of the railway problem then with us. He visualized a restoration of public and private confidence by increased private investment and helpful public co-operation. Mr. Hoover said:

Mr. Hoover's Views in 1922

"Far from it being impossible for our railways again to return to a profitable footing, I believe it possible to demonstrate that on an average they will become very profitable. * * * Surely there is room here for safety to investment, as well as relief to the shipper. * * * In these circumstances it seems to me vital that the railways as the greatest industry should propose a courageous program of broad-visioned betterments. * * * I wish to say with all responsibility for the statement that a billion dollars spent upon American railways will give more employment to the people, more advance to industry, more assistance to our farmers, than twice that sum expended outside the frontiers of the United States, and there will be greater security for the investor."

Today the carriers are prospering. Their own faith and confidence has been vindicated. Now it is to determine the direction of the economic barometer to ascertain what is ahead of us.

Our railways during 1929 probably handled more freight trafffic than in 1926—the previous peak year in railway history. And, fortunately for our country, railway management is as competent as ever to maintain leadership.

What does this leadership in transportation facilities mean? It means the acceleration of business to the greatest extent enjoyed by any nation. It means that mercantile stocks are now at a minimum because of rapid deliveries from factories to wholesalers and consumers. Whereas, in former years, it required an average of three weeks to make certain deliveries from mill to wholesaler, such deliveries now require less than two weeks. Inventories are thus cut down, and dead investments in large stocks are no longer necessary. To the consumer this means quick service, fresher and more popular goods. It also means that the retailers no longer are compelled to lay in heavy stocks that unfavorable weather or changing styles may seriously affect, making necessary a substantial carry-over from season to season with consequent depreciation in value.

Business Benefits of Improved Service

In this connection it is interesting to note that approximately $50,000,000 annually in interest alone on freight in transit in the United States is saved due to this expedited freight delivery. A railway friend of mine has recently figured this out in the following manner:

Approximately $2,000,000,000 worth of freight or more is moving continuously over our carriers. The interest on this freight at 6 per cent is $120,000,000 annually. Due to our expedited freight delivery only five-eights of the time is consumed today in handling this freight from origin to destination that was consumed in 1920, a saving of three-eights of the time, and therefore three-eights of the interest upon goods in transit.

A much more important effect of improved transportation service has been the opportunity it has afforded to almost all classes of busines concerns to reduce their inventories and thereby increase the rapidity with which they turn over the capital invested in them. At any given time there are necessarily billions of dollars invested in fuel and raw materials used in the processes of manufacture, and in consumable goods carried to fill current orders. The increased speed and dependability of freight transportation have made it possible within the last six years to effect a huge aggregate reduction in inventories. This has largely reduced the cost of carrying on business, and has also released a large amount of capital which has become available for productive purposes. The reduction of inventories has therefore had the beneficial effects of an equivalent increase in the total capital of the country.

Such facts not only reassure business leaders and give confidence to every worker—and every worker is a purchaser—but also tend to strengthen belief in the economic stability of the United States.

Public co-operation, through the agency of the Regional Advisory Boards, maintains closely the relations necessary between our transportation service and its customers. And the huge investment that will be made by our carriers in 1930 will go far, not alone towards stabilizing our employment situation and our purchasing power, but also toward overcoming what there may be of depressing tendencies, due to stock market deflation. It will also help equip the railways for continuing to improve their service and to effect economies in operation.

* * * *

Missouri-Kansas-Texas Engine Terminal at Fort Worth, Tex.

Railway Executives Optimistic Regarding Business

Expect decline of traffic, but do not believe it will be large—Capital expenditures will be maintained—Views regarding highway transportation, economies in operation and other matters

RAILWAY executives in all parts of the country express moderate optimism regarding railway freight business and earnings in 1930 in letters written in reply to a questionnaire addressed to them by the *Railway Age*. They also forecast railway capital expenditures at least as large as those made in 1929, in accordance with the program of trying to maintain general business which has been adopted by leaders in all lines of business on the initiative of President Hoover.

Most of the railway executives who authorize the *Railway Age* to quote them expect railway traffic to be smaller in 1930 than in 1929, but equal to that of 1928, although some expect the traffic of their own roads to equal that of 1929.

President Hoover and the business leaders who have been holding conferences with him anticipate that the real test of the new policy of trying to maintain business will come in the first one-third of 1930. They believe that if there is no serious slump during that period the danger will be passed, and that after that the trend will be upward. The railways will contribute fully as much in proportion as any other industry toward maintaining business during the critical period. They have already placed and are still placing large orders for equipment, rail and other materials and supplies, upon which manufacturers will have opportunity to be working during the early months of the year.

In addition to asking regarding prospects of traffic and probable expenditures, the *Railway Age* inquired of different railway executives regarding various matters, including the probable effects of waterway development; the ability of the railways to continue in effect large economies in operation; the results gained by the use of motor vehicles to effect economies and conserve railway earnings; and the co-operative policies that should be adopted by railways and local governments to reduce accidents at highway grade crossings.

Inland Waterway Development

Regarding inland waterways, L. A. Downs, president of the Illinois Central said:

"Operations on inland waterways are still in the experimental stage. Until that stage is past and the facts are known as to the ability of water carriers to attract substantial patronage of their admittedly inferior service at remunerative rates, the effects upon the railroads of inland waterway development will be uncertain. Another doubtful factor is the future of the federal barge line, which was begun and has been carried on ostensibly as an experiment by a government whose present executives, as well as the overwhelming majority of its citizens, are opposed to having the government engage in business in competition with its citizens. Under these circumstances, the announced policy of the present government administration to promote the development of inland waterways should not deter the railroads from going ahead with the additions and betterments that are required."

L. A. Downs

The president of an eastern railway said: "I think all that anybody is justified in saying at the present time is that during recent years there has been an increasing amount of business handled on inland waterways, due in part I suppose to the inland waterway improvement program of the federal government. It is probably true that but for the waterways a very large portion, if not all, of the business which the waterways carried would have moved on the railways and consequently must have been taken from the railways. I have been unable to find any definite information showing that the business of the railways has been increased in any respect or anywhere because of the influence of the inland waterways."

Whitefoord R. Cole, president of the Louisville & Nashville said, "I do not see that the policy of the national administration with respect to the development of inland waterways will have any serious effect, at least for the present, on the capital investments in railway properties."

The views expressed by railway executives upon other matters mentioned are given herewith.

Prospects of Business in 1930

H. A. Scandrett, president, Chicago, Milwaukee, St. Paul & Pacific.—We make up shortly after the first of the year a forecast of revenues and expenses, the revenues being based upon a return to a questionnaire sent to our traffic representatives and banking connections. A forecast of business conditions is made more difficult and uncertain on account of the deflation which has taken place in the stock market, and I doubt if any opinion at this time as to our 1930 earnings would be of much value. My own judgment is that our revenues in the first six months of next year will not be as large as in the corresponding period of this year, and as to what they will be in the second six months is so dependent upon crop conditions I think any opinion at this time

would be so uncertain as to be valueless.

J. J. Bernet, president, Chesapeake & Ohio.—Present prospects warrant the belief that general business conditions will improve in the early part of 1930 to the extent that the volume of railway freight traffic for the coming year will exceed that for 1928, but probably not quite reach the unusual total for 1929.

Whitefoord R. Cole

Paul Shoup, president, Southern Pacific Company.—The agricultural outlook is favorable, but depends, as always, on rainfall and other weather conditions. Lack of rain has delayed fall seeding in Pacific coast states and in some sections may result in short crops of wheat and other grains. One or two good, hard rains, however, will remedy the situation. The long dry season, as far as this year is concerned, may be counted a benefit, because in a year of good prices it enabled the farmers to make a hundred percent harvest. The citrus fruit production is expected to be about 25 per cent under 1929, when the crop was extremely large. Deciduous fruit crops will probably be larger in 1930. Lettuce and other vegetables, also cantaloupes, have shown increases each year recently, and the 1930 production is expected to exceed that of 1929.

The livestock situation in Arizona and New Mexico, where there has been ample rainfall, is favorable, but in other states served by Pacific lines the ranges are dry and the condition of livestock below normal. With rain, however, there is a possibility that range conditions may improve before spring, in which case 1930 should compare favorably with this year.

Over-production and falling off in building activity, the growing use of iron, steel, cement and other substitutes for wood in building construction, have had a serious effect for some time on the lumber industry. The pine mills are in better shape because of the continued demand for box shooks.

Mining in Arizona and New Mexico particularly is active. This condition is expected to continue, provided the price of copper remains around its present level. Increased mining operations have resulted in generally prosperous conditions in these two states.

Manufacturing industry on the Pacific coast will probably continue on about its present level, although the establishment of new industries in this territory may result in some small increases. The employment situation is generally satisfactory. There has been shortage of labor for harvesting cotton and other late fall crops. There is the usual seasonal slack of employment during the winter months, but this will probably not be serious, and prospects are for generally satisfactory employment conditions in 1930 if crop conditions are normal.

On the whole, we believe our freight traffic volume for 1930 will be approximately the same as for 1929.

J. E. Gorman, president, Chicago, Rock Island & Pacific.—General business conditions throughout the Rock Island territory are good. During the first ten months of 1929 we handled an abnormally heavy freight movement—eight of the ten months having established monthly loading records for the Rock Island. We are now encountering the usual seasonal slump, which is a little more pronounced this year due to unfavorable conditions that have existed for some time in the lumber, grain, live stock and automobile industries, and influenced to a lesser extent by the recent slump in the stock market. However, there still prevails generally a fine spirit of optimism in our territory, and indications are that by the first of next year we will experience a return to a near normal condition. The wheat throughout our territory is in splendid shape, and with the optimistic attitude, coupled with good agricultural prospects, we see no reason why we should not anticipate a continuation of a heavy movement of traffic. The passenger traffic situation does not warrant optimistic predictions for 1930, and we are meeting the reduction in passenger traffic by the substitution of motor cars for passenger trains. I am frank to tell you that we know of no way in which the railroads can increase their passenger traffic.

H. A. Scandrett

J. M. Kurn, president, St. Louis-San Francisco.—General business conditions in our territory are favorable. While there is some falling off in business, in my opinion it is mostly due to seasonal slump and weather conditions. There is a large amount of cotton still in the fields to be picked. I believe traffic in 1930 will amount to about the same as in 1929, provided, of course we have favorable crop conditions. Earnings in 1930 will, of course, depend largely upon crop conditions, and that there be no further reduction in freight rates.

F. E. Williamson, president, Chicago, Burlington & Quincy.—General business conditions in our territory remain good, but there is somewhat less activity than in the fall months of 1928 and in the first ten months of this year in merchandising and manufacturing industries. As that was a period of very heavy production and trade, our present traffic still represents a good volume of general business comparing with previous periods. Owing to our large dependence upon earnings from grain and livestock, which have not moved in normal quantities during recent months on account of market conditions, the total volume of our 1929 traffic will probably not exceed that of 1928. During the past year we have also had a somewhat slow movement of building materials. It would appear that with normal crops and market for them, and more activity, which we believe may be expected in the building lines, 1930 should be a good traffic year. Present conditions seem to indicate somewhat less general business in some industries, at least during the first part of the year, but we feel that such contraction will be of short duration.

C. E. Denney, president, Erie.—In my judgement the outlook for freight business in our territory for the year 1930 is promising. It is anticipated that our freight revenue in 1930 will equal, if not better, revenue for the year 1929. Motor trucks on the highways for shorthaul traffic and the waterways have materially affected railroad freight traffic.

W. B. Storey, president, Atchison, Topeka & Santa Fe.—Nineteen twenty-nine will go down into history as a year showing a very marked increase in freight traffic for the Santa Fe; it started strongly and continued up nearly to the close, the last few weeks, however, doing no more than holding their own in comparison with the preceding year. The main increases in freight are found in citrus fruit, grain, and oil, while livestock, lumber, grapes and cotton show declines, but not large enough to off-

set the increases. Lack of moisture during the growing season cut down the yield of almost all crops, and there were wide fluctuations in the market prices, but except for those farmers whose crops failed the returns for the year will be counted as very fair.

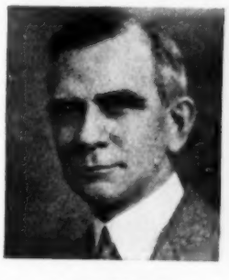
During the last few weeks of the year there have been abundant rains east of the Rockies and winter wheat is in unusually good condition for this time of year. Fair rains have broken a prolonged and severe drought on the Pacific coast and everyone out there hopes for a wet season. In other lines so far as can be judged now industry in the southwest will be reasonably active while 1930 may fall somewhat behind 1929, at least in the earlier months, we look forward to a very fair year, particularly if there are good crops, for which soil and moisture conditions are now excellent.

J. J. Bernet

L. A. Downs, president, Illinois Central System.—Despite the business recession which set in after the middle of the year, 1929 on the whole was one of the best business years ever experienced in our territory—that is, in the midsection of the country, north and south. New records were established in the output and earnings of some of the largest industries of this section, and the year was one of progress and prosperity for industry generally. Farm crops turned out well in this section, and prices were fairly good. Responsive to generally favorable conditions in industry and agriculture, trade moved freely, demand being unhampered by an accumulation of inventories. The recession which developed after midyear failed to offset the gains made in earlier months.

No more conclusive proof of the fundamentally sound condition of business could be had than was given by the upset in the stock market. The most violent price decline in the history of American stock exchanges began early in October and ran its course in record-breaking time. With greater participation in the market than ever before, losses were terrific and widespread. However, business withstood the shock of these losses almost unbelievably well. One explanation therefor lies in the virtual absence of surplus goods at points along the way from producer to consumer, a situation for which the good service provided by the railroads cannot be over-praised. It is entirely possible that good railway service, in addition to its other benefits, was thus a major factor in adverting a serious business panic.

Looking into the future physical conditions would seem to point to a good business year in 1930. The deflation in stock prices may itself be a blessing in disguise, if it succeeds in turning into the many productive enterprises of the country a substantial part of the great volume of credit which has gone to support trading in stocks. In addition, the fact remains that business generally is not over expanded, either in capacity or in accumulated goods, and the American people have suffered no diminution of their ability to produce and consume the goods and services which are the materials of business activity. These conditions are physical. Also to be reckoned with is the psychological factor, the importance of which we as a people have only begun to understand in recent years. That this factor also is favorable for a good year would seem to be indicated by the encouraging pronouncements of business leaders and the generally optimistic attitude that has been taken following the collapse of stock prices.



Paul Shoup

A. C. Needles, president, Norfolk & Western.—Many factors in favor of continuing industrial activity are evident, and we anticipate that coal tonnage, the principal item of our freight traffic, will approximate in 1930 the volume of the year 1929. Compared with peak movement of recent months, our present rate of coal production shows a decline, but nearly equals the 1929 average.

Whitefoord R. Cole, president, Louisville & Nashville.—The unprecedentedly heavy decline in the market value of stocks, resulting, as it has, in tremendous losses to many investors, as well as a marked reduction in the buying power of the public generally, will undoubtedly have some effect on the immediate future of business; but since it is widely recognized and appreciated that business is sound fundamentally, I believe the slackened conditions as a result of this situation are largely temporary. At any rate, I see nothing in conditions throughout this territory to warrant the belief that business for next year will not continue in a substantially normal volume.

J. J. Pelley, president, New York, New Haven & Hartford.—Even before the break in the stock market there were signs of a slowing-up in business, and in our opinion the break in the market simply intensified the downward movement. In the territory served by the New Haven industry is diversified, but is naturally being somewhat affected by the recession. As a guess, business in 1930 will be somewhat similar to that in 1928. Railroads ordinarily handling large quantities of materials used in automobile production and building construction are likely to have a somewhat greater decrease in traffic than others, but the action of the federal government and the states in authorizing public works may offset the reduction to some extent. To sum it up, 1930 should be a reasonably good business year, but not up to the peak reached in 1929.

Ralph Budd, president, Great Northern.—General business is rather slow in Great Northern territory, and the prospects are that it will remain so for the first six months of 1930. The principal reason for this is a drought which extended over a large part of the country.

Capital Expenditures in the New Year

L. A. Downs, president, Illinois Central.—The factors which govern railway purchases for additions and betterments seem to be undergoing a definite change. In the past the necessity of providing greatly increased railway capacity has been the more important factor in budget making, and economy of operation has come largely as a by product of expenditures primarily made to increase capacity. The trend of recent years seems to show plainly that increases in railway traffic are being scaled down, as a result of which the greater emphasis is coming to be placed upon getting efficiency and economy in operation, although increased capacity is a by-product of such improvements. Possibilities in that direction are large. Even with the greater emphasis upon providing for increased capacity, the results of spending money to save money have been thoroughly demonstrated. The ability of the railways to make exten-

sive purchases in the money-saving field will depend immediately upon their earning power—a fact which gives every business man who sells to the railroads a vital interest in safeguarding their net earnings from the erosive effects of reduced rates and increased taxes.

The future division of railway expenditures for additions and betterments as between new equipment and roadway improvements would seem to rest chiefly upon the relative ability of manufacturers in these respective fields to adjust themselves to the changed conditions just described. While the greater possibilities of economy may seem to lie in roadway improvements, it is entirely possible for equipment and appliance manufacturers to improve their relative position by inventive genius and aggressive salesmanship. The necessity of increased economy will also spur the railroads themselves to bend their energies toward making the most of their possibilities in both fields.

J. E. Gorman

A. C. Needles, president, Norfolk & Western.—We have under way a program of additions and betterments involving very substantial expenditures and on which we expect to continue work during the coming year. The greater part of this carry-over work is in connection with permanent structures. However, we have under consideration additional authorizations for expenditures on rebuilding of equipment and for new equipment, and it is probable that capital expenditures in 1930 will divide nearly equally for equipment and for road work.

J. J. Pelley, president, New York, New Haven & Hartford.—The general policy of the railroads in 1930, as publicly expressed by their executives will be to continue the improvement of their property. The New Haven's program, which compares favorably with that of prior years, was established prior to the slump in the market, and no departures from that program are contemplated.

We expect the tendency in effect since 1923 toward relatively greater expenditures for permanent improvements than for equipment to continue because the possibilities for effecting economies, increasing capacity and improving service are generally greater from such improvements than through expenditures for equipment. We do not expect any increase in the percentage of expenditures for equipment in 1930. Generally the railroads are well equipped and because of the increased efficiency of operation the equipment now available is adequate, as evidenced by the performance in the heavy traffic months of 1929. The New Haven ordered in 1929 for delivery in early 1930, considerable passenger equipment, including 100 coaches of the most modern type, 10 diners, 15 compartment mail cars and 9 multiple unit cars. In addition, the New Haven authorized in November, 1929, the purchase of ten electric passenger locomotives of the most modern design and with increased capacity and 33 multiple unit motor cars and trailers, for delivery in the fall of 1930. The New Haven has just about completed its box car rebuilding and is proceeding with the rebuilding of its open top cars. The only freight carrying equipment purchases in prospect are small lots of cars for special purposes.

J. M. Kurn

W. B. Storey, president, Atchison, Topeka & Santa Fe.—The Santa Fe is now at work building 155 miles of new lines of railroad in Texas and hopes shortly to secure authority from the Interstate Commerce Commission to build 380 miles more, extending over portions of the states of Texas, Oklahoma, Colorado and New Mexico; it is buying over $18,000,000 of new cars and locomotives; and it will make about $24,000,000 of improvements on existing facilities during next year.

Ralph Budd, president, Great Northern.—Our budget for next year is approximately $19,000,000 for capital expenditures, the equipment portion being about $12,000,000, which is larger than last year. In addition to this, of course, there will be the usual maintenance charges incidental to the improvement work, and also the regular maintenance work.

J. M. Kurn, president, St. Louis-San Francisco.—We are now ordering, for delivery in 1930,

20 large Mikado-type freight engines,
2500 fifty-ton box cars,
300 fifty-foot automobile cars,
700 all-steel flat-bottom gondolas,
10 all-steel baggage and mail cars,
10 all-steel baggage cars,
3 dining cars.

and we will construct in our own shops 300 lowside drop-end gondolas. The total cost of this equipment will be approximately $12,000,000. We will have about the same improvement budget as in 1929. In addition we now have before the Interstate Commerce Commission an application for authority to acquire the Gulf, Texas & Western railroad, also application for authority to construct a line from Vernon to Seymour, Texas, in connection with the Gulf, Texas & Western, a distance of approximately 44 miles.

F. E. Williamson, president, Chicago, Burlington & Quincy.—While our complete budget of capital expenditures has not been prepared, we have already authorized the purchase of considerable new equipment, both locomotives and cars, and it is probable that with these authorizations the ratio of our expenditures for equipment to the total capital expenditures will be greater than for several preceding years. We have a normal list of improvements in roadway and structures for the year, and, including expenditures on some uncompleted projects previously authorized, our total expenditures for 1930 will probably be more than for some years.

C. E. Denney, president, Erie.—Assuming our prediction of a satisfactory volume of business in the early months of 1930 is correct, the capital expenditures, in my opinion will compare favorably with recent years. So far as our line is concerned, expenditures for improvement of roadway and structures will increase in about the same proportion as expenditures for new equipment. In my judgment, the capital expenditures of all railroads will be devoted largely to improvements aimed to effect economies in operation. Certain terminals, especially in the larger centers of population, will have to be gradually increased to adequately take care of the traffic.

Paul Shoup, president, Southern Pacific.—Southern Pacific and its subsidiaries, Northwestern Pacific and the Pacific Electric, will be in complete accord with Presi-

dent Hoover's plan for the maintenance of faith in the stability of American business. This company and its subsidiaries plan new investment expenditures during 1930 totaling more than $50,000,000. In the allotment of these expenditures the proportions for improvement of permanent structures and expenditures for equipment will be practically the same as last year. Proposed expenditures will include a $5,000,000 order for 120,789 tons of steel rail; $15,000,000 in new sidings, reballasting tracks and similar improvements; $8,300,000 for 576 units of operating and working equipment. This latter will include 35 steam locomotives, two electric locomotives, 47 units of passenger train equipment, 400 units of freight train equipment and 8 units of working equipment. We will also build in our own shops 60 cabooses and 20 locomotive tenders. Part of the 1930 rail order will be used in the construction of 75 miles of second track on the Overland, Coast and Sunset routes. The company will spend a large sum to rehabilitate its 29-mile San Ramon branch line between Avon and Radum. After reconstruction this branch will be used as a main line, to handle traffic routed over the new Suisun Bay bridge which, incidentally, is 20 per cent completed and is expected to be opened for operation by Thanksgiving day, 1930.

F. E. Williamson

Jobs now under way which will be completed during 1930 include the $2,250,000 installation of automatic signals and a 32-mile signal dispatching system.

The company is also pressing to completion a new and modern station and more than five miles of double track line in the city of San Jose. The estimated cost of this entire job, which involves the relocation of the station, is $3,300,000.

Whitefoord R. Cole, president, Louisville & Nashville.—The question regarding the probable policy of the railways with respect to improvement work for 1930 has now, I think, been fully answered by the action of the various executives in their recent communication to President Hoover as the result of the conference at Washington. Their expressions of confidence in the future and their assurances that they hope and expect to proceed on at least a normal basis with their future capital and maintenance expenditures, and if possible to increase them, are, I think, representative of more than a mere indication of what they propose to do in the railway field; they serve, also, to exhibit a strong determination to cooperate in every possible way in sustaining the prosperity of the country.

For the Louisville & Nashville railroad, I may say that we are proceeding with our improvement work in substantially the same manner and degree that we have in the recent past, having only recently authorized a large appropriation for the acquisition of new equipment and new rail for 1930, and this appropriation will be substantially augmented by authorities for other new work that will be granted from time to time as the year progresses, and is in addition to the large amount of work being prosecuted currently on appropriations heretofore authorized.

H. A. Scandrett, president, Chicago, Milwaukee, St. Paul & Pacific.—Our budget for 1930 has not yet been made up, and will not be completed until the latter part of January. I can say, however, that on account of the large purchases of equipment which we have made during the past two years our purchases next year will be less. This year our purchases of new equipment totalled approximately $15,000,000, and in 1930 I anticipate they will be about $10,000,000. On the other hand, our budget for improvements, other than new equipment, will be larger. Our budget this year called for expenditures, other than new equipment, of approximately $12,000,000. As to 1930, the best I can say at this time, in the absence of a complete budget, is that I think our expenditures for other than new equipment will be somewhere in the neighborhood of $15,000,000.

C. E. Denney

As to the relationship between expenditures for fixed improvements and for equipment: In the case of this company I find that the percentage of road capital expenditures in every year subsequent to 1923 has been greater than in that year, but this increase has not been progressively greater in each year, the percentages in question being as follows:

1923....13.9%	1926....88.2%	1929....42.0% (Partly estimated)
1924....50.0%	1927....68.2%	1930....60.0% (Estimated)
1925....22.1%	1928....39.3%	

As already stated, owing to rather large expenditures for new equipment in 1928 and 1929, our purchases for 1930 will be somewhat less and, therefore, the proportion of total capital expenditures for 1930 made for equipment will be less than in 1929.

J. J. Bernet, president, Chesapeake & Ohio.—I believe that the railways, generally, will proceed as usual with normal programs of maintenance and improvements. There are good reasons to think that the railroads will continue to improve and modernize their facilities and equipment to increase efficiency and reduce operating costs.

J. E. Gorman, president, Chicago, Rock Island & Pacific.—The 1930 budget of the C. R. I. & P. is the largest program of improvements and new equipment it has ever had. The total of the 1930 improvement budget amounts to approximately $50,000,000. Of this total expenditure $20,374,000 is for new equipment; $7,376,000 for new lines; $900,000 for additional second main track; $3,970,000 for major improvement items such as flood protection, new yards, grade revision, track elevation; river straightening, Chicago; deep waterway, Joliet; etc., and $13,750,000 for general improvement to existing roadway and equipment. The improvement program of the Rock Island for 1930 shows large increases both in equipment and roadway.

The Future of Economies in Operation

J. J. Pelley, president, New York, New Haven & Hartford.—It is true that the comparative prosperity of the railroads in recent years, and notably 1929, has been caused by the increase in freight traffic and large economies in operation, made possible through large expenditures of capital. The railroads cannot expect economies to accrue as rapidly in the future as in the past, because the limit of further savings is being more closely approached each year, and it is now necessary to make a much larger capital expenditure for the same saving than was the case a few years ago. For that reason it is important that a halt should be called on many of the numerous rate reductions, some of them slight, but which

aggregate large in total, as if continued they will seriously impair the earning powers of the railroads because economies cannot be expected to accrue at the same rate in the future as in recent years.

C. E. Denney, president, Erie.—Whatever prosperity the railways have enjoyed this year is, in my opinion, due to a general increase in freight traffic, plus large economies in operation. I do not believe that the railways can reasonably expect through capital expenditures and other means to continue to effect indefinitely the large economies in operation which they have heretofore been successful in bringing about.

W. B. Storey

A. C. Needles, president, Norfolk & Western.—Our capital expenditures for several years past have been large and many economies in operation have resulted therefrom. It is anticipated that our capital expenditures in 1930, including carry-over work, will be at least fifteen million dollars, and this program contemplates economies in operation as well as expansion of facilities.

J. M. Kurn, president, St. Louis-San Francisco.—The year 1929 was a prosperous year, but in order to accomplish the result and to offset heavy reduction in freight rates and losses in passenger traffic, it was necessary to economize in every possible manner in operations, and this of course was accomplished through the introduction of new methods, running engines in long mileage, closing a large number of divisional roundhouses, and a great number of other economies, a considerable part of which we were able to do on account of money spent in the last few years for general improvements.

Co-ordination of Rail and Highway Transport

Paul Shoup, president, Southern Pacific.—Southern Pacific like all other lines has suffered heavy loss in its passenger business through the private automobile and motor bus. This loss is increased with the increase in highways paralleling our lines. Some of our branch lines have been put out of passenger business, and it has been necessary to abandon many local trains, which it became unprofitable to operate on account of this highway competition. Although our passenger revenues showed an increase for the first ten months of 1929 compared with the same period for 1928, this was due largely to heavy convention travel, low one-way coach fares, special holiday excursion rates and generally prosperous conditions throughout the country.

Our stock ownership in major bus lines serving this territory has also resulted in some benefits. For instance, in soliciting passenger business we treat the consolidated bus system as a friendly competitor, thus having two transportation agencies soliciting and securing traffic without distrust. This has eliminated suspicion and unfair competition and has resulted, I think, in the conservation of revenues. Our interest in the motor bus lines has enabled us to arrange with them to handle certain party movements which for economy or policy reasons we did not wish to handle by rail. We believe that we have effected substantial net savings in operating costs by substituting motor bus service for train service.

A. C. Needles

Our local revenue between San Francisco and Portland has been increasing largely as result of low coach fares. At the same time, motor bus revenues have been growing, showing that harmonizing the two services has been beneficial to both.

We have not yet developed the gathering power of the bus system as an auxiliary to railroad service, but hope eventually to do this with greater interchange of tickets than now exists.

Ralph Budd, president, Great Northern.—To a limited extent use can be made of motor coaches and trucks by railways, but such operation generally is not profitable.

J. J. Pelley, president, New York, New Haven & Hartford.—Commencing in 1925, the New Haven, through its subsidiary—The New England Transportation Company—commenced the substitution of highway buses for passenger train service, and the results have been satisfactory. The entire loss of passenger traffic cannot be offset by motor coach operation, or otherwise, but as traffic decreases, the substitution of either rail cars, where there is sufficient traffic to justify them, or highway buses reduces the losses.

In August, 1929, the New Haven also commenced to substitute highway truck operation for local freight train service, trucking operations having been previously confined to terminal work, principally in New York. This highway trucking is also conducted through the New England Transportation Company and it is expected that service will be improved, which should result in increased freight traffic. There should also be some economies through substituting trucks for local freight train service. The motor truck's field is limited to short distances or special commodities, but where these conditions exist, we see no reason why the railways should not utilize trucks.

F. E. Williamson, president, Chicago, Burlington & Quincy.—Experience has shown that the losses in local or short-haul passenger business may be only partly overcome by the use of motor buses. There are a great many difficulties encountered in the taking off of local train service, so that this movement has been very slow, and also there is the mail and express traffic which could not move efficiently and reliably otherwise than by rail. With the rail lines in existence and performing comfortable and fast service, it does not seem economical to the country as a whole to divert anything but short haul business to the highways. The motor bus cannot displace the through passenger service, which now constitutes the bulk of the passenger business of the railroads. There is a considerable long distance travel by bus, but fast and comfortable modes of travel over long distances must always be available to the public. There are numerous instances where motor trucks may be used profitably for transportation of less-than-carload freight, but by no means all of this character of traffic could be economically handled that way, considering that we have the existing rail lines, freight houses for concentration of packages, and an efficient merchandise car system in effect. It is likely that much business is now being handled by motor trucks that is costing more, to the country as a whole, considering upkeep of highways, than it would cost had it remained on the rail lines.

Paul Shoup, president, Southern Pacific.—It has not been our experience that railway grade crossing accidents continue to

increase because of the increase in the number of motor vehicles. Through the press, schools, churches, automobile associations, chambers of commerce and our own safety organizations, the Southern Pacific has devoted much effort to educating the users of the highway in safe practices in approaching railroad tracks at grade. This has been supplemented of course, by the installation of warning signals and watchmen at the more densely traveled crossings. The net result of this work has been that with an increase of 6.2 per cent in automobile registration in states traversed by Southern Pacific lines, grade crossing accidents reportable to the Interstate Commerce Commission for 1928 were reduced 11.6 per cent in the number of accidents, 20.9 per cent in the number of persons killed and 17.1 per cent in number of persons injured as compared with the year 1927.

J. J. Pelley

C. E. Denney, president, Erie.—Public authorities should share equally with the railroads the responsibility and burden of preventing, so far as practicable, grade crossing accidents. The old view that the railroad is principally or solely responsible for such prevention is obsolete. It is based on the original railroad legislation which arose out of the conditions of a century ago.

The vast increase in the number and speed of vehicles on the highways in recent years has been accompanied by an actual decrease in the number of locomotives moving over most highways, resulting from increased locomotive capacity and other changes whereby the increased railroad traffic is transported in fewer units. Striking figures supporting this statement were submitted by a special commission of inquiry to the last session of the New Jersey Legislature.

Specifically, the states or municipalities should assume 50 per cent of the cost of installing and maintaining automatic visual signals at highway grade crossings where the traffic justifies such signals, and the public authorities should extend to railroad crossings the "boulevard stop principle" which in many localities is being applied to intersections of highways. That is, where traffic conditions justify it, an absolute stop of the vehicle on the highway should be required by law before entering upon the railroad crossing.

There should be additional co-operation by the public authorities in grade crossing elimination where the traffic justifies the expenditures.

The most economical way of taking care of the expense of such elimination is by utilizing the credit of the state, and financing the entire cost by long term state obligations, the railroad company refunding to the state the railroad share of the expense. This plan has been established by an amendment to the constitution of the State of New York and should be extended to other states.

Some states have not yet made any adequate provision for the division of the cost of grade crossing elimination between the railroads and the state. In New Jersey the legislature has provided for the equal division of the expense of eliminations on state highways, and has indicated its acceptance of the principle that this should be done at other crossings, but has not yet made provision therefor. Wherever the state has not yet made suitable provision for a fair division of the cost, it should be done at the earliest opportunity, with proper safeguards against excessive expenditures.

Ralph Budd

H. A. Scandrett, president, Chicago, Milwaukee, St. Paul & Pacific.—Policies of co-operative action by the railways and public authorities should include the closing of those streets and highways where travel is light and diverting such travel to a nearby street or highway, thereby reducing the number of crossings to be protected, if at grade, or the number of bridges to be constructed, if grade is separated. The cost of grade separation should be distributed equitably between the public and the railways, giving consideration to the benefits to each. This should result in the railways paying a smaller proportion of the cost, thus enabling them to separate grades at more crossings by the expenditure of the total amount of money the railways can reasonably devote to such improvements consistently with their other obligations.

Owing to the wide territory traversed during the present-day automobile tour, distinctive and uniform warning signs and mechanical protection would be helpful in reducing the number of crossing accidents. In addition, in country districts the highway commissioners should provide and maintain approach warning signs of a uniform and striking character.

J. E. Gorman, president, Chicago, Rock Island & Pacific.—The Rock Island has been following a consistent program of crossing protection in states, cities and towns. We are co-operating with local authorities by installation of flash-light signals and other safety devices, and in addition are spending large sums of money in the elimination of grade crossings at important highways. The large expense of grade separations makes it impossible for the railroads to eliminate more than a few crossings annually, and legislation which would properly distribute the expense of grade separation as between the states, counties, cities, and the railway companies would do much toward improving the situation. Again, statutes requiring every driver of an automobile to come to a complete stop and then look and listen before passing over grade crossings would, of course, eliminate a great percentage of grade crossing accidents. Such a law should contain penalties for its violation, and should further provide that failure to stop, look and listen would constitute a bar to any recovery of damages that might result from collision with trains passing over crossings. It is, of course, doubtful whether the railroads could secure such legislation.

L. A. Downs, president, Illinois Central.—Co-operative action by the railroads and public authorities to arrest the increase of crossing accidents can best take form in measures designed to minimize carelessness at crossings and on the highway generally. Law enforcement is one such measure—not merely the enforcement of stop laws, but the enforcement of all laws which give promise of making drivers give greater heed to their own safety, the safety of their passengers, the safety of pedestrians and the safety of other users of the highways, including those who use them as crossings. Educational activities are another and perhaps a more important measure. The far-reaching effects of the safety programs that are being carried on in the schools are beyond estimation. That educational measures are getting results seems to be indicated by the fact that the

ratio of crossing accidents to highway travel is declining.

J. M. Kurn, president, St. Louis-San Francisco.—We are working with the various states and cities in the matter of eliminating grade crossings, and we will continue the policy. It is realized of course that this is a very extensive and expensive proposition and that it will necessarily take several years to accomplish the end. We are having a large number of crossing accidents, the greater percentage of which are due to automobiles running into and colliding with our trains. We are in fact having about as many of this kind as we are of those where we actually strike automobiles.

F. W. Sargent

Ninety-five per cent of these accidents could be avoided if states and cities would work wholeheartedly with the railroads by passing laws and ordinances to compel all vehicles to be brought to a full stop before crossing railroad tracks for occupants to ascertain if everything is clear, and by providing a penalty for the non-observance, and enforcing the law or ordinance, keeping these measures in effect until such time as it is possible to eliminate grade crossings.

A Statement from Fred W. Sargent

The following contribution from F. W. Sargent, president of the Chicago & North Western, was received too late to permit his expressions being grouped by subject matter with the statements of other railroad executives. Said Mr. Sargent:

Business Prospects Good

"Replying to yours of the fourteenth ultimo I beg to say that general business conditions in the territory served by the Chicago and North Western Railway System are encouraging. The territory is conspicuously agricultural and the general outlook for business in 1930 is good.

"The increase in efficiency of the lines now in existence is of vast importance. To accomplish this most effectively, equipment and adequate terminal facilities are of vital importance. Capital expenditures for 1930 will undoubtedly equal those of previous years. The present capacity of our railroads, so far as main tracks are concerned, is greater than the traffic moved, and past experience shows that the only cause for congestion is due to inadequate terminals at important points. Improvement of terminals and continued purchase of new equipment will assure the maintenance of the present high state of efficiency and the rapid and dependable transportation of goods and persons.

Economic Study of Waterways Needed

"The development of inland waterways is largely in an experimental state. If we grant that transportation on them is feasible from an engineering standpoint, we still have left the making of thorough surveys as to commercial possibilities with a view of ascertaining what returns can be produced on the investment. These studies are now in progress by a committee of the United States Chamber of Commerce. What they will reveal I do not know. The importance of such studies is, however, clearly apparent.

"Certain of our inland waterways, upon which it is proposed to make large expenditures, are confronted with some serious natural handicaps such as high and low water, resulting from floods and droughts; shifting sand bars, and ice in the winter weather. Possibly engineering genius will overcome all these difficulties but the cost must be measured by the returns on available and possible traffic.

"I see no occasion for rail carriers to curtail their expenditures on account of potential water competition, for I believe that transportation by railroad will continue to be the chief means of moving property and persons and the nation's commerce. The factors of time and dependability are becoming more important with each passing year."

* * * *

Baltimore & Ohio Yards at Cincinnati, Ohio, from the Southern Bridge

Quality Development in 1930

Expect larger railway buying with emphasis on improvements for operating economy

By Alba B. Johnson
President, Railway Business Association

AS the railway supply guild looks ahead into 1930 the outstanding features in the prospect seem to be these:

1. Surplus of available rolling stock at the 1929 traffic peak a fraction of one per cent less than a year ago in freight locomotives, and a fraction of one per cent larger in freight cars; total tractive power and car capacity a trifle reduced.

2. Traffic outlook for moderate declines under a year previous in the early months, with recovery toward summer as the construction programs proposed by President Hoover mature into pay rolls, flushing the channels of trade.

3. Railway buying substantially larger than in 1929, with emphasis on improvements for operating economy.

For 1929 the peak four weeks were again in October. If under traffic pressure the bad-order freight locomotives could have been reduced from 13.9 per cent to 13 per cent (never yet reached), the tractive power thus brought in, added to the good-order power not in use, would have given at the date of greatest depletion an available margin of 129,490,003 pounds or 7.3 per cent of power owned. A year ago this slack was 7.5 per cent. If in an emergency bad-order freight cars could have been reduced from 5.7 per cent to 5 per cent (never yet attained), the car capacity thus gained, plus good-order capacity stored, would have made an available slack of 5,682,555 tons at date of smallest surplus, or 5.4 per cent of car capacity owned. In 1928 this was 5.3 per cent. These percentages, 7.3 per cent as to power and 5.4 per cent as to car capacity, indicate that the railways 1929 over 1928 did not widen the margin of safety against future traffic growth. The figures may be compared with the actual increase in car-loadings 1926 over 1925, when the four banner weeks rose 7.7 per cent. For the 12 months ended October 15, 1929, tractive power of freight locomotives owned declined 1.7 per cent, and tons of freight car capacity owned fell 0.4 per cent.

Alba B. Johnson

Car performance depends not alone upon aggregate car tonnage capacity, but upon actual average car loading (the most stubborn record of all those which increasing railway efficiency has sought to break) and upon locomotive performance. This last item is affected by all factors of efficiency in plant and management throughout the whole complex business. "Car Surplus" indicates "facility surplus."

Traffic Prospects

As to the outlook for railroad earnings, upon which railroad purchases in the ultimate depend, the country is making actual trial of capital expenditures upon plant to prevent or soften a trade recession. This course the Railway Business Association for 21 years has recommended to governments, utilities industries and business, as well as to railroads. Never before did they respond. Each group cited obstacles. Railway officers always pointed out that under regulation as it is administered few roads could amass the necessary reserves to carry them through a depression with the plants they had, to say nothing of enlargements in time of traffic decline. If, they said, everyone else economized, their traffic and earnings would further shrink, and the railroad that persisted in anticipating the future with capital outlay would be "holding the bag" for the rest of the country, as no road could very long do. Yet now such a step has been made practicable.

As nearly everyone in our guild can testify, the autumn stock market adjustment, threatening by all time-honored precedents a curtailment of consumption, was followed by wide-spread quick-freezing of miscellaneous railroad contracts previously regarded as ripe. Drastic slashing of 1930 railway budgets was assured. November 19 railway executives conferred with President Hoover who throughout his cabinet service had been advocating plant improvements in recessions and who through public discussion and conferences had acquired much information about the difficulties, limitations and possibilities. What the President could say to the executives was something that nobody had ever before been in position to say to them—that they were being asked to hold not the whole bag but only their corner of it; that everyone else would cooperate in keeping "business as usual.

To the President, of course, the railroads appeared

not alone a relatively large industry, spending for operation, maintenance and capital purposes in 1929 well over 4½ billions; but an industry well organized for statistical exchange, common counsel and action in serving the public, which would enable a prompt response, and a regulated industry, accustomed to comply when it hears its master's voice. The executives assured the President that they would take the lead, maintain their budgets and canvass the possibility of enlarging them. President Aishton of the American Railway Association at the U. S. Chamber conference presented figures based upon individual assurances from all Class I roads and actual votes of boards from many.

Railway and Supply Men at Chicago

In Chicago our General Executive Committee met November 20, our Association November 21, the Association of Railway Executives and the American Railway Association November 21 and 22 respectively. At the Stevens Hotel on the evening of the Railway Business Association dinner the foyers held 1700-odd railway officers and supply manufacturers, who later sat at our table for three hours. Never were conversation and visiting about so animated. The subject was the news that railway budgets were to be maintained and perhaps increased. The manufacturers had accepted this as authentic or, if any doubt survived, the oral confirmation was conclusive. Present or absent the whole craft throughout the country took on the mental attitude of men who know what to expect and will act accordingly.

R. B. A. Questionnaire

Arriving home from Chicago, I found the invitation of the U. S. Chamber to a conference where we were requested to report on the state and prospects of the industry. A questionnaire was distributed, calling for total figures of each company's product, railway and non-railway. The variety of trades represented is wide; and though many members did not answer in time for the Chamber and some not at all, including whole product groups, and though to avoid duplication we omitted cars and steel rails, the drift in percentages was, of course, a straw on industry as a whole. The items were (1) compensation to employees; (2) expenditures for material, fuel, supplies and freights; (3) expenditures for plant enlargements and improvements. Forecasts included declines, which were incorporated in the aggregates as they came without any design to affect the showing as a whole. Returns received since December 5 would swell the aggregate but not affect the drift, and have not been embodied. The grand totals as submitted were:

Actual, 12 months	1928	$1,484,151,264
Actual and estimated, 12 months	1929	1,762,125,145
Increase		18.8%
Actual, 1st six months	1929	807,950,593
Estimated, 1st six months	1930	830,402,053
Increase		2.8%

Members were asked: "What contingent factors will offset the accuracy of forecast for the first six months 1930?" Practically all replied: "The ability and determination of the railways to maintain their budgets."

General Traffic

Consumption meantime, as reflected in trade, is reported by department, chain and other retail stores to have been spared the expected slump, but L. C. L. car loadings, usually taken to measure such trade, for the weeks so far reported since November 1 were 5.1 per cent down from 1928. We are cautioned against expectation of sudden or immediate recovery while plant enlargement and improvement is going through the process that precedes general expenditures, and especially are warned not to exaggerate into a scare the annual normal January dip in trade and employment.

Character of Railway Buying

Railway programs of maintenance, additions and betterments, as always, present a combination of two motives. Some of it is to cover quantity requirements to keep pace with traffic needs estimated to be more or less immediate. Another part of the total is concentrated upon improvements made primarily for operating economy. In the present situation, with the executives urged to enlarge capital budgets beyond those that were contemplated before the Wall Street upset, it might be guessed that so far as practicable on relatively short notice the additional capital expenditures will be used to cut down operating expenses.

In conversation the other day a high authority on equipment was asked whether he did not regard recent progress as indicating a more fertile field for economies in power than in cars. "I cannot say yes to that," said he. "The substitution of steel for wood and the development of the draft gear to absorb the weight may save us as much in maintenance and replacement as locomotive progress, great as it has been, is saving us."

I could not get figures measuring the application of capital to cars for economy, but in locomotives I am informed for instance that in the six years ended 1928 the percentage of power owned (this is foreign and domestic) equipped with the superheater has risen from 51.8 per cent to 70 per cent. The railroad upon which this improved rolling stock runs is a different railroad. Capital has been poured into it. Though linear miles of track 1922 to 1928 declined 0.4 per cent, additional main track, yard track and sidings increased 10.1 per cent; average weight of rail per yard rose 6.3 per cent; miles of railroad operated by telegraph dropped 19.4 per cent and by telephone involving a great outlay for the more expensive copper wire, advanced 20.9 per cent; miles equipped with block signals gained 10.3 per cent; and automatic train control, installed in 1922 on 290 miles, covered in 1928 15,090 miles.

All these improvements are spreading to one road after another as more systems enter the zone of financial ability to install them. The mileage and the rolling stock per cent still remaining to be modernized with appliances already standard remains large. Very likely 1930 will go down in our annals as a year of notable advance in quality development.

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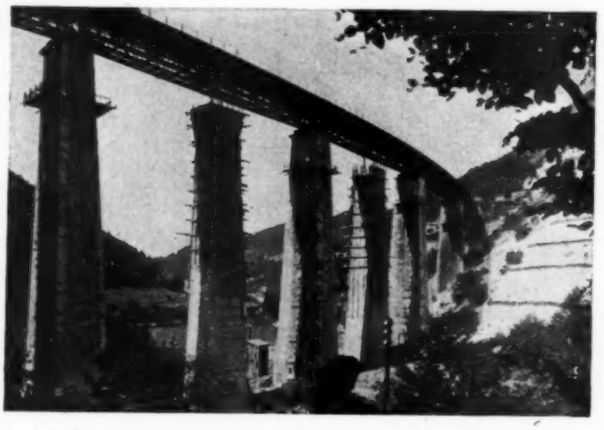
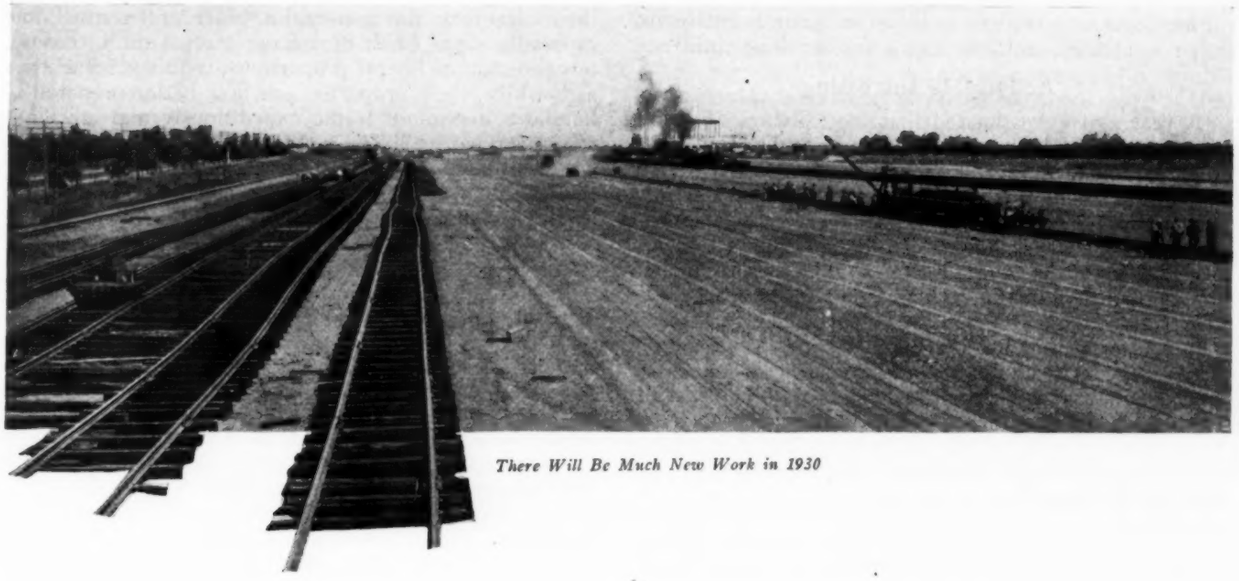


Rebuilding the St. Ursanne (Switzerland) Viaduct without Interruption to Traffic



There Will Be Much New Work in 1930

Railways Will Spend $1,200,000,000 for Improvements in 1930

Budgets of roads of United States, Canada and Mexico are 25 per cent larger than in 1929

By Elmer T. Howson
Western Editor, *Railway Age*

THE railways of the United States, Canada and Mexico will spend more than $1,200,000,000 for new equipment and for additions and improvements to their properties in 1930. This is at a rate of $4,000,000 per working day. Of this amount the roads of the United States alone will spend $1,050,000,000. In other words the programs on which the roads are now working involve expenditures exceeding those for the year which has just closed by more than $250,000,000 or 25 per cent, an increase of nearly one million dollars per working day. In fact they bid fair to exceed those of any previous year in history with the possible exception of 1923, the year in which the railways in the United States inaugurated their extensive program of rehabilitation and improvements which involved capital expenditures aggregating $1,059,149,000 in that year.

This forecast is based on an analysis of the budgets furnished us by 40 of the larger roads, extending into widely separated parts of the continent with an aggregate mileage of more than 145,000, or nearly 50 percent of that of the three countries, supplemented by statements from the executives of other roads as to their plans for the development of their respective properties. It also recognizes and checks the similar but less detailed survey made by the Association of Railway Executives, the results of which were made public by R. H. Aishton, chairman of the executive committee of that organization in a statement made before the National Business Survey Conference at Washington, D. C., on December 5.

In considering this estimate it should be borne in mind that it includes only those expenditures chargeable to capital account for additional or improved facilities, to the exclusion of the still larger amounts that go for the normal maintenance and repair of the present properties, which amounts are incorporated in operating expenses. These latter expenditures aggregated $1,300,000,000 for materials and $3,000,000,000 for labor during 1929 and since their magnitude is influenced largely by the nature of the improvement or capital expenditures program, it is to be expected that they will at least maintain, if they do not exceed, last year's level in the year which is now opening.

In no previous year since the analysis of the budgets of the railroads was first incorporated in the Annual Statistical issue of the *Railway Age* has there been as great interest in the proposed expenditures of the railroads as this year. This has resulted primarily from the steps taken by President Hoover to stimulate business, following the collapse of the stock market, in which he called first on the railroads to maintain and increase their current programs of maintenance and improvement work as a means of insuring continued

prosperity. The response of the railroads was so prompt and so complete as to serve as an incentive for other industries and has had a far-reaching influence.

Activity Is Increasing

A year ago we estimated that the railways of North America would spend approximately $800,000,000 for improvements chargeable to capital account during 1929. Although this figure was $50,000,000 greater than the actual expenditures during 1928, its conservative character was shown by the fact that actual expenditures in the United States alone approximated that amount while the Canadian and Mexican roads added more than $100,000,000 to the total. Such a result was a natural outcome of a period of expanding activities which led to the authorization of unusually large sums for added improvements as the year advanced. The early months of 1929 were characterized by new records in volume of business handled and in net earnings, which stimulated expenditures for improvements the effect of which continued through the closing months of the year.

While few railway men anticipate that the present facilities of the roads will be taxed by traffic during at least the early part of 1930, they recognize that the marked reductions that have been made in operating expenses of late have been made possible largely by the liberal expenditures for improvements during the last six years and they appreciate further that there are still further large opportunities in this direction. It is the recognition of that fact that is prompting the continuation of liberal expenditures of this character.

In Canada the outlook for continued heavy capital expenditures is equally promising, although prompted in part by a different motive. While many improvements are being made to existing lines to expedite or reduce the cost of handling traffic, the major expenditures of the two leading Canadian systems during 1929 were for the construction of lines into areas now largely without transportation facilities. During the year, as a result, the mileage of new lines completed in Canada exceeded that in the United States, a record that has been made only once before. The outlook is for an equally active year in 1930, particularly in the Western provinces where the competition between the two large systems for territory is especially keen at present.

In Mexico the railways are gradually emerging from the period of instability and destruction that stopped all progress during the succession of revolutions since 1913. While the uprising of last spring resulted in the destruction of much railroad property, it was defeated so decisively that conditions are now more stable than at any time since the days of Diaz. As a result, railway improvement work and particularly the extension of lines into new areas is gaining momentum and larger expenditures are being planned for this year.

Annual Capital Expenditures—Class I Railroads

Calendar Year	Amount
1920	$653,267,000
1921	557,035,000
1922	429,273,000
1923	1,059,149,000
1924	874,743,000
1925	748,191,000
1926	885,086,000
1927	771,552,000
1928	676,665,000
1929 (last three months estimated)	800,000,000

The program to which the railroads are working this year is noteworthy by reason of its magnitude, particularly because of the years of heavy expenditures which have preceded it, especially in the United States. Following the return of the roads in the States to their owners at the termination of federal control, and especially since 1922, they have carried on a continuous program of liberal proportions, with the result that, as a whole, their properties are now better prepared to handle a maximum traffic expeditiously and efficiently than ever before. The capital expenditures which the Class I roads of the United States have made during the last ten years approximate $7,500,000,000, as shown by the accompanying table.

Limitations of this Survey

In studying a survey of this character one should, of course, consider the limitations under which it is, of necessity, made. In the first place a considerable number, although a minority, of the roads do not prepare annual budgets but appropriate for improvements as the need arises and the funds are available. This group includes such prominent roads as the New York Central Lines, the Lehigh Valley and the Louisville & Nashville. Furthermore, a budget is, by nature, an *estimate* of the expenditures that a road expects to make during the year and is subject to revision as the year advances and the needs and the revenues become more apparent. It is, however, the best available index of the expenditures that are contemplated and is followed fairly accurately on most roads.

In preparing our analysis of this year's expenditures we are confronted with another obstacle, i.e., the delays on the part of many roads in completing their budgets until after the first of the year, in which cases their figures are not available before this survey goes to press. While this difficulty has steadily become more pronounced during recent years as the immediate necessity for added facilities has disappeared and the importance of an early start in the spring has become less apparent, the action of President Hoover in urging industries in the United States to survey their needs and to formulate programs to relieve them, has caused many of these railways to complete their budgets more promptly this year than in the past. As a result we have received the desired data from more than twice as many roads this year as last.

In analyzing the amounts included in the budgets of the various roads, it is recognized that these roads will not complete all of the projects for which provision is made, for some of them of necessity require more than one year for completion. Unexpected delays of one kind or another also necessitate the carrying over of work into the following year. However, this is a normal condition, although the amount carried over from 1928 into 1929 was $51,540,000 greater than carried over from the previous year by reason of the large volume of expenditures authorized during the closing months of 1928. That a still larger amount has been carried over into 1930 is shown by the fact that, whereas the authorized unexpended appropriations on October 1, 1928, totaled $402,000,000, they rose to $674,000,000 on October 1, last. While much of this latter sum was expended during the closing quarter of the year, large additional appropriations were made during this period for new work and particularly for equipment, with the result that the appropriations carried over into 1930 unexpended and available for expenditure during this year, in addition to the sums allotted in the budgets, is estimated to exceed $500,000,000. To arrive at the total amount available for expenditure during 1930, the appropriations carried over from the preceding year should, of course, be added to those included in the budgets for the new year, although since a

somewhat similar amount will probably be carried over unexpended into 1931, the sum that will actually be spent for improvements in 1930 will approximate that in the budgets.

The Data Available

In our study of the expenditures in prospect, we had before us the budgets of 40 roads with an aggregate mileage of more than 145,000 or nearly 50 per cent of the total of the three countries. In addition we have partial figures from other roads with more than 12,000 miles of lines. The total expenditures included in these complete and partial budgets exceed $565,000,000.

Included among the roads which have given us the information regarding their contemplated expenditures for 1930 are 30 which gave us similar figures last year. The total expenditures which these roads planned a year ago aggregated $324,102,731 while the budgets for these same roads for this year total $397,724,476. In other words, the expenditures now contemplated by these 30 roads exceed those planned by the same lines last year by $70,000,000 or 22 per cent.

The roads which have provided us with information regarding their contemplated expenditures include among others, the following:

Atchison, Topeka & Santa Fe
Baltimore & Ohio
Bangor & Aroostook
Boston & Maine
Buffalo, Rochester & Pittsburgh
Central Railroad of New Jersey
Chicago & Alton
Chicago & Illinois Midland
Chicago, Burlington & Quincy
Chicago, Indianapolis & Louisville
Chicago, Milwaukee, St. Paul & Pacific
Chicago, Rock Island & Pacific
Delaware & Hudson
Delaware, Lackawanna & Western
Denver & Rio Grande Western
Duluth & Iron Range
Duluth, Missabe & Northern
Elgin, Joliet & Eastern
Florida East Coast
Great Northern
Gulf, Mobile & Northern
Illinois Central
Kansas City Southern
Lehigh Valley
Louisville & Nashville
Maine Central
Missouri-Kansas-Texas
Missouri Pacific
New York, New Haven & Hartford
Norfolk & Western
Northern Pacific
Reading
St. Louis-San Francisco
St. Louis Southwestern
Southern Pacific Lines in Texas and Louisiana
Southern Pacific, Pacific System
Union Pacific System
Virginian
Wabash

Attitude of Executives

In addition to these statistical evidences of increased activity next year, there are presented on preceding pages in this issue statements from a number of prominent railways executives expressing their attitude towards the improvement of railway facilities. Outstanding among these is the statement of J. E. Gorman that the budget of the Rock Island is the largest in the history of that road, totaling approximately $50,000,000. Paul Shoup likewise states that the Southern Pacific and its subsidiaries are in complete accord with President Hoover's plan for the maintenance of faith in the stability of American business and are also planning improvement expenditures aggregating more than $50,000,000. F. E. Williamson of the Burlington is another executive who expects that expenditures in 1930 will exceed those for the year that has just closed.

A. C. Needles, president of the Norfolk & Western advises that while the capital expenditures of that road have been large for several years, that road has under way a program of additions and betterments involving very substantial expenditures, on which it expects to continue work during the year. In a similar vein, J. J. Pelley advises that the New Haven's program compares favorably with that of recent years and that while prepared prior to the slump in the stock market, it is expected to be adhered to without regard to that development. Likewise W. R. Cole of the Louisville & Nashville stated that, "We are proceeding with our improvement work in substantially the same degree as in the recent past," while Charles Donnelly advises there will be no curtailment of expenditures on the Northern Pacific but rather that this road will enter vigorously on a program of maintenance and improvement of its properties in 1930. Other executives who express their intention to prosecute their improvement programs actively include J. J. Bernet of the Chesapeake & Ohio, E. E. Loomis of the Lehigh Valley, Ralp Budd of the Great Northern and C. E. Denney of the Erie.

In a somewhat less optimistic strain the president of one large eastern road calls attention to the fact that the traffic handled by the roads in the Eastern region has been practically stationary for the last nine years and that, with the adequate supply of equipment now available, there would seem to be no immediate need for additional expenditures except to replace this equipment as it wears out.

As is to be expected the degree of activity planned by different roads, even in the same territory, varies widely. On the Rock Island, for instance, where improvement work was held to a low level until the last three or four years, it is planned to spend nearly $50,000,000 in 1930 in the largest program ever undertaken by this property. On the Illinois Central, on the other hand, where an extensive program has been brought to completion during the last two years, only routine expenditures are contemplated this year and the budget total is placed at $16,000,000. Other large budgets include those of the Santa Fe, $40,700,000; the Southern Pacific, $50,000,000; the Baltimore & Ohio, $32,000,000; the St. Louis-San Francisco, $22,000,000; the Great Northern, $19,000,000; the New York, New Haven & Hartford, $18,700,000 and the Boston & Maine, $16,000,000.

Division Between Roadway and Equipment

In any analysis of the expenditures contemplated by the railways, the division of these expenditures between improvements and additions to roadway and to equipment is always of primary interest. This has been particularly true of late years for, as pointed out by L. A. Downs, president of the Illinois Central, "the factors which govern railway purchases for additions and betterments seem to be undergoing a definite change. In the past the necessity of providing greatly increased railway capacity has been the more important factor in budget making, and economy of operation has come largely as a byproduct of expenditures primarily made to increase capacity. The trend of recent years seems to show plainly that increases in railway traffic are being scaled down, as a result of which the greater emphasis is coming to be placed upon getting efficiency and economy in operation, although increased capacity is a byproduct of such improvements. Possibilities in that direction are large. Even with the greater emphasis upon providing for increased capacity, the results of spending money to save money have been thoroughly demonstrated.

"The future division of railway expenditures for additions and betterments as between new equipment and roadway improvements would seem to rest chiefly upon the relative ability of manufacturers in these respective fields to adjust themselves to the changed conditions just described. While the greater possibilities of economy may seem to lie in roadway improvements, it is entirely possible for equipment and appliance manufacturers to improve their relative position by inventive genius and aggressive salesmanship. The necessity of increased economy will also spur the railroads themselves to bend their energies toward making the most of their possibilities in both fields."

The trend to which Mr. Downs refers is shown in the following distribution of the capital expenditures in recent years:

Year	Total Capital Expenditures	Expenditures for Equipment	Per Cent of Total	Expenditures for Roadway	Per Cent of Total
1923	$1,059,149,426	$681,723,991	64	$377,425,435	36
1924	874,743,228	493,608,460	56	381,134,768	44
1925	784,191,000	338,114,000	45	410,077,000	55
1926	875,000,000	380,000,000	43	495,000,000	57
1927	771,552,000	288,700,000	37	482,852,000	63
1928	676,665,000	224,301,000	33	452,364,000	67
1929 (First 9 months)	573,820,000	210,689,000	37	363,131,000	63

That the tendency to devote increasingly large proportions of the total expenditures for roadway improvements is being arrested, is indicated by the fact that the proportion of the expenditures that went for roadway purposes declined in the first nine months of 1929 to 63 percent as contrasted with 67 percent during the previous year. This reversal of trend is still further accentuated by the study of the budgets for 1930, in which it is found that, for those roads which have given us the division of their budgets, the proportion allocated for equipment has risen to 41 percent as contrasted with 59 percent for roadway improvements.

A Big Equipment Year

This provides a most optimistic outlook for the builders of equipment, for it indicates that the car and locomotive buying movement which became so evident in the latter half of last year will continue during 1930. When one considers that the total expenditures authorized for the year now opening will exceed those for last year by 25 percent and the further fact that the proportion of this enlarged program that will go for equipment has risen from 33 percent in 1928 to an estimated 41 percent in 1930, it can be seen that the outlay for equipment in 1930 should be 50 percent more than in 1929. To a considerable extent, these appropriations are for equipment already ordered but on which delivery has not yet been made and for which payment is not yet due, although the budgets also indicate that other large orders are still contemplated.

Larger Expenditures for Roadway

Notwithstanding the increased proportion of the expenditures that is allotted for equipment this year, the increase in the total appropriations is so great that the actual amounts set aside for roadway improvements will also exceed those of 1929 by at least 15 percent.

In addition to equipment, these budgets include appropriations for the wide variety of roadway facilities. Even though we have passed through the period of extensive development, so far as the United States at least is concerned, one of the largest items in the appropriations is still that for extensions. While the mileage of new lines completed in 1929 was less than for any of the three preceding years, the mileage under construction at the end of the year and that projected indicates that 1930 should show a total of new lines completed equal to if not exceeding that for any year since the beginning of the war. In Canada an unusually large mileage is projected or under construction, particularly in the prairie provinces, while in the United States there is similar activity in the Southwest and also in Montana. Several projects in these latter areas are as yet awaiting the approval of the Interstate Commerce Commission although it acted favorably on some of these applications during the closing weeks of the year. Unique with respect to extensions was the action of the Commission in December in issuing an order requiring the O.W.R. & N. unit of the Union Pacific System to construct a line 181 miles long from Crane, Oregon, west to a connection with the Portland-San Francisco line of the Southern Pacific, without application from this road and in the face of its opposition.

From the information furnished us, it is evident that the expenditures which the railways will make for the construction of new lines in the United States, Canada and Mexico will exceed $100,000,000 during 1930. In the United States this includes more than $8,000,000 for the 1930 proportion of the construction cost of 535 miles of extensions contemplated by the Santa Fe, $12,000,000 for the building of two lines by another Western road, $10,600,000 for four lines aggregating 212 miles by the Rock Island and $2,162,000 for the building of 67 miles of lines in three sections by the St. Louis-San Francisco anticipating in several instances the approval by the Interstate Commerce Commission.

For second and other main tracks it is apparent that there will be relatively little construction activity this year, a tendency that has resulted from the great increase in the utilization of existing tracks made possible by improvements in signaling, such as dispatcher control, etc. The largest appropriations for this purpose for which we had the data, have been made by the Baltimore & Ohio and the Missouri Pacific which have set aside $3,575,000 and $3,150,000 respectively. Similarly the appropriations for shop and engine terminals, at least for the roads for which we have data, will be light, another reflection of the changes that are coming about in railway operating methods—long engine runs in this instance. For freight classification yards and for freight and passenger stations considerably heavier expenditures are contemplated, the indications being that the roads will spend upwards of $20,000,000 for freight yards and for passenger and freight stations.

The outstanding feature of the roadway budgets, however, is the steadily increasing amounts which are going for grade separation, largely in compliance with state or local governmental orders. These demands are practically universal, for every road is confronted with them. Indicative of the magnitude of these expenditures are the following appropriations for 1930:

Baltimore & Ohio	$2,716,000
Reading	$2,369,737
Delaware, Lackawanna & Western	1,484,972
Delaware & Hudson	1,400,000
Wabash	1,100,000
Boston & Maine	1,000,000
Union Pacific	975,000
New York, New Haven & Hartford	974,000

Based upon the data contained in the budgets to which we have access, the railways of the United States alone will spend more for the elimination of grade crossings in 1930 than for freight stations, engine terminals, shops and signals.

Summary

During the year which has just closed the railways made greater expenditures for improvements than in either of the two preceding years. Furthermore, this was the seventh consecutive year in which the expenditures chargeable to capital account have approximated $800,000,000. As a result, the railways are better prepared to meet the demands that may reasonably be made on them, with promptness and without congestion. The increased programs which are in hand for next year are not only, therefore, an expression of confidence, and of willingness to co-operate in President Hoover's program for business stability but are also a recognition of the fact that the railways can continue to spend vast sums to still further improve the efficiency of their operations and to still further reduce the cost of handling traffic.

A Review of Railway Operations in 1929

Ton-mile record probably broken—Operating ratio lowered to 71.4 per cent—Roads earn about 4.9 per cent on investment

By Julius H. Parmelee
Director, Bureau of Railway Economics

EVERY year supplies its own story of railway performance. Traffic may go up or down. Efficiency may continue to improve. The financial results may be encouraging or not. To weave these factors into a composite picture is no easy task, but the picture, if accurately sketched, presents a profile of commerce and industry as a whole, for the railways, as we must remind ourselves from time to time, serve all industries and all sections. Their traffic rises and falls with the curve of commercial activity, and they prosper in sympathy with the nation's prosperity.

An analysis of railway results in 1929 will, therefore, bring out some of the significant economic trends of that year, and will throw light on the effect of the financial upheaval that occurred during the autumn months.

Railway freight traffic in 1928 lagged behind the preceding year until July, then turned upward for the balance of the year, bringing the year's aggregate to a point higher than in 1927, and only slightly below the record-breaking totals of 1926. The momentum so gained at the end of 1928 carried over into 1929, and every month to September showed an increase over 1928. Again there was a turning point, this time downward, which first appeared in October and continued through the balance of the year. The net result of a traffic increase for nine months of 1929, and a decrease for the last three months, was an increase over 1928 as a whole, amounting to more than two per cent in terms of carloadings, and more than three per cent in terms of ton-miles. Compared with 1926, the previous record year of freight traffic, carloadings showed a slight decrease, and ton-miles apparently a slight increase.

Passenger traffic continued its decline, but at a lower rate than in 1928.

Financial results closely followed the traffic factors. Freight revenue increased and passenger revenue fell off. With the assistance of increases in all revenue groups, except from passenger service, and with the further assistance of back mail pay receipts during the year, total operating revenues showed an increase. Operating expenses and taxes also increased, but the net operating income maintained a position about seven per cent above 1928. This net operating income increased consistently during the first eight months of 1929, and as consistently declined during the remaining four months.

Rate of return on property investment approximated five per cent in 1929, compared with 4.71 per cent in 1928.

Striking progress was made in operating efficiency. Nearly all the factors of performance registered some gain, so that the whole standard of opeartion moved upward to a higher level than ever before. The results for 1929 again marked a forward step in the railway program for greater operating efficiency, which year by year since 1923 has been making its growing contribution to the economic progress and stability of the United States. This fact is coming to be realized by business men, economists, and others, and official recognition of it may be found in many quarters.

The latest annual report of the Secretary of Commerce, for example, contains the following succinct appraisal of the economic value of railway efficiency:

> The quality of service furnished by the railways, as well as by other public carriers, is better now than at any other time in the history of the country. Shortages of cars have now become rare occurrences. At present it takes scarcely two-thirds as long to move goods a given distance as it did a decade ago. With the increasing efficiency with which traffic is being handled, producers are able to make quicker deliveries and distributors are able to carry smaller stocks and to turn over their capital more quickly. As a result goods are cheapened to consumers.

In his annual report to Congress, the President of the United States expressed the same thought in somewhat different language, as follows:

> As a whole, the railroads never were in such good physical and financial condition, and the country has never been so well served by them. The greatest volume of freight traffic ever tendered is being carried at a speed never before attained and with satisfaction to the shippers. Efficiencies and new methods have resulted in reduction in the cost of providing freight transportation, and freight rates show a continuous descending line from the level enforced by the World War.

Toward the close of the year, the nation received another striking indication of the extent to which the railway industry contributes to the common welfare, not only through its transportation service, but also through many collateral channels. The railways supply employment to many other industries through purchases of material and supplies, and

Dr. Julius H. Parmelee

through their programs of capital improvement. They distribute large sums in these and other ways.

When stock market prices broke sharply in late October and succeeding weeks, and it became necessary to re-establish confidence, leaders turned to the railway industry at once for help. Railway representatives were first to be called to the White House for conference, and when a nation-wide plan for the general conference at Washington on December 5 was formulated, the railway spokesman was again first on the program. He was able to assure the country that the railways would continue to buy supplies, would increase their capital expenditures in 1930, and would contribute loyally to continued industrial activity.

General Summary

A summary of the principal factors of railway operation in 1929 reveals the following significant features:

1. Revenue freight carloadings were greater by 2.4 per cent than in 1928, and stood at a higher level than in any previous year except 1926.

2. Net ton-miles for the year were 3.1 per cent greater than in 1928. Indications are that this freight traffic factor was greater than in any previous year, even surpassing the previous record attained in 1926.

3. Passenger-miles declined in ten of the twelve months of 1929, the decrease for 1929 as a whole being about 1.4 per cent.

4. Total operating revenues increased 2.8 per cent over 1928. Railway revenues in 1929 fell below those of 1923, and slightly below 1926, but were greater than in any other preceding year.

5. Total operating expenses were higher than in 1928 by 1.5 per cent, but fell below those of any preceding year back to 1922. Maintenance expenses in 1929 showed slight increases, but the cost of conducting transportation remained almost stationary, despite the increase in freight traffic.

6. The operating ratio really tells the story of economy of operation. This ratio stood at 71.4 per cent in 1929, which was lower than in any year since 1917. The railways have continued to exert a strict control over their expenses.

7. Net railway operating income aggregated $1,227,000,000, an increase of $84,000,000, over 1928.

8. The rate of return on property investment in 1929 was 4.97 per cent. This was higher than the 4.71 per cent of 1928, and about the same as the rate earned in 1926.

9. Maximum levels of performance were reached in at least twelve factors of efficient operation, while the railways maintained satisfactory levels in the majority of the remaining factors.

10. The index of general railway efficiency in 1929 was higher than in any year since the war, being nearly three per cent above 1928, and more than 25 per cent above 1922.

Railway Traffic in 1929

Freight and passenger traffic in 1929 showed varying tendencies, as in all the years since 1923. Freight business went up, while the passenger business continued to decline.

The freight traffic story for 1929 falls into two distinct periods. From January to September both carloadings and ton-miles ran consistently above the corresponding months of 1928, while from September to the end of the year they ran as consistently behind. Totals for the year were slightly below 1926 for carloadings, but appear to have been slightly greater than in 1926, when measured in ton-miles.

Table I is a brief summary of freight and passenger traffic statistics in 1929, compared with 1926, 1927, and 1928. Five-year averages, for the years 1924 to 1928, are also included.

Table I

COMPARATIVE TRAFFIC RESULTS

Revenue Carloadings	
1929	52,800,000
1928	51,587,000
1927	51,636,000
1926	53,099,000
5-year av. 1924–1928	51,213,988
Net Ton-Miles	
1929	492,000,000,000
1928	476,994,000,000
1927	474,696,000,000
1926	488,702,000,000
5-year av. 1924–1928	465,225,000,000
Passenger-Miles	
1929	31,100,000,000
1928	31,538,000,000
1927	33,656,000,000
1926	35,499,000,000
5-year av. 1924–1928	34,555,000,000

Revenue carloadings approximated 52,800,000 cars in 1929. This total was 2.4 per cent greater than for 1928, but was six-tenths of one per cent less than the peak reached in 1926. The aggregate for 1929 surpassed the five-year annual average to 1928 by 3.1 per cent.

Net ton-miles (which include both revenue and non-revenue movement) amounted to 492 billions in 1929. This total, which is still an estimated figure, was 3.1 per cent greater than in 1928, seven-tenths of one per cent above the previous 1926 peak, and 5.8 per cent above the five-year average.

The estimated ton-mile total for 1929 represents the greatest freight traffic of any year of record. The previous record attained in 1926 now falls into second place.

The last four years—1926 to 1929—have been the four largest years of freight traffic on American railways. If the present estimate for 1929 proves to be correct, then the four years may be arranged in the following order:

First—1929
Second—1926
Third—1928
Fourth—1927

All these years are closely grouped, with respect to ton-mile results. The total for 1929 is but 0.7 per cent in excess of 1926, 3.1 per cent above 1928, and 3.6 per cent above 1927. Thus the spread between the largest and the smallest traffic during the four years was less than four per cent.

Passenger-miles fell 1.4 per cent below 1928, and by varying but almost constantly increasing percentages were less than in every year since the peak traffic handled in 1920. The aggregate of passenger travel by rail in 1929 was smaller than in any previous year since 1908. The total loss between 1920 and 1929 was 33.6 per cent. The only hopeful element in the passenger situation is that the relative loss in 1929 was only a fourth as great as it was in 1928, and about a third as great as in 1927.

The revenue carloading figures in Table I are compilations of the Car Service Division of the American Railway Association. Net ton-mile statistics are based upon reports of the Interstate Commerce Commission, and include both revenue and non-revenue movement. The passenger-mile statistics are also based upon reports of the Commission, and include revenue movement only.

All the statistics reviewed in this and succeeding

tables and charts relate to railways of Class I. As this review goes to press before the close of the year, it is clear that all the statistics relating to 1929 are partial estimates, and are subject to later revision.

Carloadings

The total revenue loadings of freight in 1929 aggregated 52,800,000 cars, equivalent to an average of 1,015,000 per week. This is a fraction of one per cent below the corresponding total and weekly average for 1926, which remains the highest year on record.

Average weekly loadings, for the ten years from 1920 to 1929, show a generally rising trend as follows:

1920	868,000	1925	985,000
1921	756,000	1926	1,021,000
1922	831,000	1927	993,000
1923	958,000	1928	992,000
1924	933,000	1929	1,015,000

The net increase for the period as a whole was from a weekly average of 868,000 cars in 1920 to 1,015,000 cars in 1929, or 16.9 per cent. Two years of the period —1926 and 1929—averaged more than a million cars per week, while two other years—1927 and 1928—missed that average by less than 10,000 cars.

Freight loadings reached a million cars per week in five weeks during 1920. No million-car weeks were experienced in either 1921 or 1922. During the six years from 1923 to 1928, a total of 131 million-car weeks occurred, or nearly 22 per year. In 1929 there were 28 million-car weeks, which ties the previous high total of 28 similar weeks in 1927. A million or more cars were registered in 27 weeks during 1926, 28 in 1927, and 24 in 1928.

Successive peak weeks have been established from time to time, passing the million-car mark for the first time in 1920, and rising to an all-time peak of 1,208,878 cars in 1926. The maximum attained in 1928 was 1,196,965 cars. The peak for 1929 occurred during the week ending September 28, when 1,202,111 cars were loaded. This was slightly above the high week of 1928, but six-tenths of one per cent below the record loading for a single week.

Ton-Miles

Net ton-miles increased 3.1 per cent over 1928. As already stated, present indications are that the ton-mile aggregate for 1929 was greater than in any previous year, surpassing the previous peak (1926) by seven-tenths of one per cent.

Chart A shows the net ton-miles for each month of 1929, compared with 1928 and the five-year average from 1924 to 1928. The chart emphasizes the statement already made, to the effect that the first nine months ran ahead of 1928, and the last three months behind. The estimated totals, for November and December, in fact, dropped not only below the corresponding months of 1928, but also below the average November and December returns of the past five years.

Comparing the four years from 1926 to 1929, it appears that 1929 led the other years in its ton-mile totals for six of the twelve months, namely, February, and April to August; 1926 led during the last four months, September to December; 1927 led in January and March. A similar comparison covering carloadings indicates that during the first 50 weeks of the year (to December 14), 1929 led in 21 weeks, 1926 in 14 weeks, 1927 in 12 weeks, and 1928 in 3 weeks.

Table II brings out clearly the difference in the trend of freight traffic in 1929 compared with 1928, from that of 1928 compared with 1927. This table is set up on the basis of carloadings, but the trend is similar to that

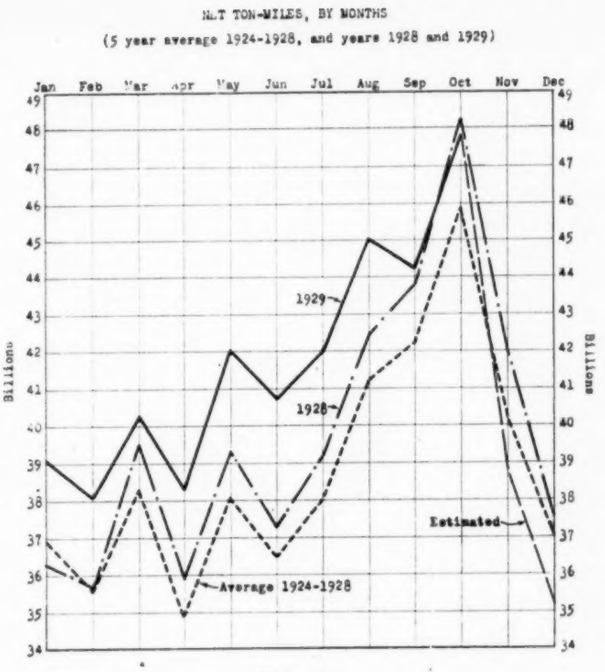


Chart A

in ton-miles. The statistics are cumulative, showing how the totals for one month, two months, etc., compare.

The year 1928 got off to a bad start, compared with 1927, and every cumulative period to the end of the year showed a decline under the preceding year, but the percentage of decrease fell steadily until it almost touched zero by the end. A reverse picture is seen in 1929, when the earlier months of the year all showed increases over 1928 ranging from 3.0 to 4.7 per cent. This cumulative increase began to drop rapidly after August, and reached a low mark of 2.1 per cent in December.

Table II

COMPARISON OF CUMULATIVE CARLOADING TOTALS

To end of:	Per cent increase or decrease 1929 vs. 1928	1928 vs. 1927
January	Inc. 3.5	Dec. 8.2
February	Inc. 4.2	Dec. 6.9
March	Inc. 3.0	Dec. 6.0
April	Inc. 3.9	Dec. 5.4
May	Inc. 4.1	Dec. 4.8
June	Inc. 4.6	Dec. 4.2
July	Inc. 4.7	Dec. 3.5
August	Inc. 4.7	Dec. 3.0
September	Inc. 4.3	Dec. 2.4
October	Inc. 3.8	Dec. 1.6
November	Inc. 2.9	Dec. 0.6
December	Inc. 2.1	Dec. 0.1

Stating the same trend in somewhat different terms, net ton-miles for the first nine months of 1929 showed an increase of 5.8 per cent over the corresponding months of 1928, while the last three months decreased 4.1 per cent.

Still another presentation involves a comparison of increases or decreases in carloadings on the basis of a three-month "moving average." This method compares any two years by averaging successive periods of three months each, passing from one period to the next by dropping the first month of the three, and adding another at the end. Such a presentation brings out the marked difference between 1927, 1928 and 1929, and offers some suggestion as to the possibilities for 1930.

Table III presents such a three-month moving average of carloadings for the years 1927, 1928 and 1929, the percentages shown being the rate of change (in-

crease or decrease) compared with corresponding periods one year earlier.

Table III

MOVING AVERAGE OF CARLOADINGS BY THREE-MONTH PERIODS

Period		Per cent change
Jan.-Mar.	(1927)	I 3.4
Feb.-Apr.		I 3.1
Mar.-May		I 1.5
Apr.-June		D 0.5
May-July		D 3.3
June-Aug.		D 3.9
July-Sept.		D 4.1
Aug.-Oct.		D 4.6
Sept.-Nov.		D 6.6
Oct.-Dec.		D 7.6
Nov.-Jan.	(1928)	D 8.4
Dec.-Feb.		D 7.0
Jan.-Mar.		D 6.2
Feb.-Apr.		D 4.6
Mar.-May		D 3.6
Apr.-June		D 2.6
May-July		D 1.1
June-Aug.		D 0.5
July-Sept.		I 0.1
Aug.-Oct.		I 2.2
Sept.-Nov.		I 5.5
Oct.-Dec.		I 7.1
Nov.-Jan.	(1929)	I 6.8
Dec.-Feb.		I 4.8
Jan.-Mar.		I 3.0
Feb.-Apr.		I 3.9
Mar.-May		I 4.0
Apr.-June		I 6.2
May-July		I 5.8
June-Aug.		I 5.5
July-Sept.		I 3.7
Aug.-Oct.		I 1.9
Sept.-Nov.		D 1.7
Oct.-Dec.		D 3.6

The first three periods of 1927 showed increases, then a long and gradually growing succession of decreases to the end of that year. The next year, 1928, started with decreases, but these gradually declined to August, then shifted into the increase side, and the increases rose to the end of that year. These increases continued into 1929, but showed a gradually declining tendency to October, with the exception of an upward spurt from March to June. The last two periods of 1929 registered decreases under 1928. The striking downward curve of 1927, upward curve of 1928, and generally declining curve of 1929, can best be visualized in graphic form, and are brought out in Chart B.

Basing a forecast for 1929 on a similar chart presented in last year's review, we said: "With all the

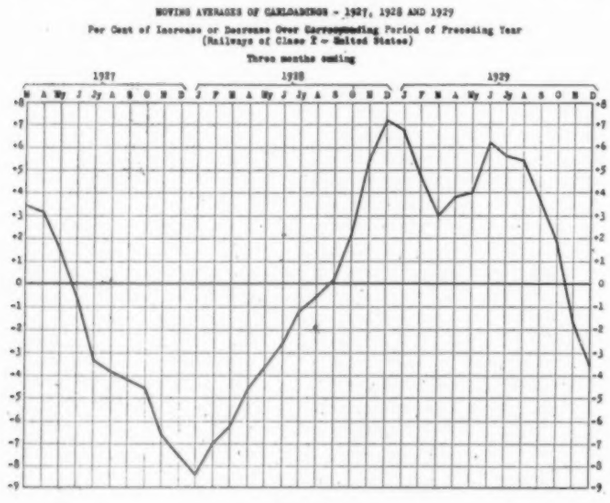

MOVING AVERAGES OF CARLOADINGS - 1927, 1928 AND 1929
Per Cent of Increase or Decrease Over Corresponding Period of Preceding Year
(Railways of Class I - United States)
Three months ending
1927
1928
1929
J F M A My J Jy A S O N D J F M A My J Jy A S O N D J F M A My J Jy A S O N D
+8 +7 +6 +5 +4 +3 +2 +1 0 -1 -2 -3 -4 -5 -6 -7 -8 -9

Chart B

dangers of prophecy in mind, we may express the belief that the curve will continue at a relatively high level for a few months longer before it takes another and inevitable downward swing. Whether these 'few months' will be the first two months of 1929, or four, or six, is a question, but it seems more likely to be six than two." Actual results for the year show that the months stretched out to nine, before the break came, but it came at last.

Does Chart B supply any basis for a forecast of the probable freight traffic in 1930? If the purely statistical trend continues as in the past six months, the railways may expect a traffic during the spring and early summer months below that of the corresponding periods of 1929. Fortunately, there are indications that the concerted effort of business to overcome the psychological effect of market deflation—what the President termed the "emotions of undue pessimism, fear, uncertainty, and hesitation in business"—will have a heartening effect. If it does, the statistical trend may give way to a psychological turn upward.

Loadings According to Commodities

Table IV distributes the revenue carloadings of 1929 into the eight general groups among which the Car Service Division classifies them. To supply a basis of comparison with the preceding year, the percentage distribution is shown for 1929, and for 1928 as well.

Table IV

DISTRIBUTION OF COMMODITY CARLOADINGS

	Number	Per cent 1929	Per cent 1928
Grain and products	2,346,000	4.43	4.87
Live stock	1,433,000	2.72	2.95
Coal	9,185,000	17.40	17.00
Coke	623,000	1.18	1.03
Forest products	3,243,000	6.14	6.47
Ore	2,391,000	4.53	3.70
Mdse. L.C.L.	13,270,000	25.13	25.51
Misc.	20,309,000	38.47	38.47
Total	52,800,000	100.00	100.00

Comparison of 1929 with 1928 shows that the larger groups followed the same general trend as all commodities combined, and that their proportion of the total movement did not change greatly. The largest group, miscellaneous, showed no change in percentage. Merchandise contributed a slightly smaller proportion of the total, coal slightly increased, and forest products declined. Of the remaining four groups, ore and coke increased, while grain and live stock declined. The largest proportionate increase occurred in respect to ore, while the largest proportionate decline occurred in grain.

Financial Results in 1929

Total operating revenues amounted to $6,354,000,000 which was an increase of 176 million dollars, or 2.8 per cent, over 1928.

Total operating expenses aggregated $4,538,000,000, which was an increase of 65 million dollars, or 1.5 per cent.

The operating ratio, or percentage relationship between revenues and expenses, declined in 1929 to 71.4 per cent. This compares with 72.4 per cent in 1928. The operating ratio declined steadily each year from 1920 to 1926, turned slightly upward in 1927, and fell again in 1928 and 1929. The ratio of 71.4 per cent attained in 1929 was lower than in any previous year since 1917, and stood nearly three points below the average of the five years to 1928.

Railway taxes in 1929 amounted to $420,000,000, an increase of 25 million dollars, or 6.3 per cent, over 1928. Not only did railway taxes in 1929 cross the $400,000,000 mark and rise to a larger aggregate than ever before—despite the corporation income tax reduction granted industry during the past year—but they also absorbed a larger proportion of the gross revenues than in any preceding year. The ratio of taxes to operating revenues was 6.6 per cent in 1929, as against 6.4 per cent in

1928 and 6.1 per cent during the five years to 1928. Stated differently, 6.6 cents of every dollar of railway operating revenue last year was turned over to federal, state and local governments in the form of taxes, and the tide of taxation shows no indication of an ebb, either absolutely or relatively.

Table V is a condensed income account for 1929, 1928, and the five years, and includes the principal financial items of railway operations in those years.

Thus railway revenues, expenses, and taxes all increased in 1929. But the increase in revenues being relatively greater than in expenses, net operating income also showed an increase. It aggregated $1,277,000,000 compared with $1,193,000,000 in 1928. This was an increase of 84 million dollars, or 7.0 per cent, over 1928.

Table V

CONDENSED RAILWAY INCOME ACCOUNT

	1929 (millions)	1928 (millions)	Average 1924-1928 (millions)
Total operating revenues	$6,354	$6,178	$6,205
Total operating expenses	4,538	4,473	4,594
Taxes	420	395	376
Net operating income	1,277	1,193	1,127
Operating ratio	71.4	72.4	74.0
Return on property investment	4.97%	4.71%	4.57%

While the net operating income aggregate was greater than in any year since the war, the growth in the property investment kept the rate below five per cent, as in all previous years.

Rate of return on investment is computed by relating net operating income on a percentage basis to the aggregate of the road and equipment account, materials and supplies, and cash. On this basis financial results in 1929 produced a rate of return of 4.97 per cent. The rate earned last year was greater than in 1928, and also greater than in any year since pre-war days, except 1926.

Table VI presents the rate of return for each year from 1921 to 1929. This covers the whole period since the close of the federal control and guaranty periods in 1920. The rates are computed on the basis of the investment reported at the end of each year, except that for 1929. Because the statistics are not yet available, the rate for 1929 is based on the investment as it stood at the beginning of that year. For purposes of comparison with 1928, the rates for that year are shown on both an end-of-the-year and a beginning-of-the-year basis. If computed on the end-of-the-year investment, the rate for 1929 would drop from 4.97 to about 4.90 per cent.

Table VI

RATE OF RETURN ON PROPERTY INVESTMENT COMPUTED ON INVESTMENT AT END OF YEAR

1921	2.84%
1922	3.58
1923	4.33
1924	4.21
1925	4.74
1926	4.98
1927	4.29
1928	4.64
Computed on investment at *beginning* of year:	
1928	4.71%
1929	4.97

Corresponding rates of return on investment for the three districts in 1929 were as follows: East 5.61 per cent; South 3.95 per cent, and West 4.60 per cent.

During the nine years from 1921 to 1929, the rate of return on investment never quite reached five per cent, and in two of the years (1921 and 1922) fell below four per cent.

Railway Operating Revenues

Total operating revenues increased 2.8 per cent over 1928, and 2.4 per cent over the five-year annual average to 1928. Freight, mail, express, and "other" revenue all showed increases; passenger revenue alone declined.

Table VII summarizes the component items of operating revenue, the returns for 1929 being compared with 1928 and the five-year period 1924 to 1928.

Table VII

OPERATING REVENUES

	1929 (millions)	1928 (millions)	Average 1924-1928 (millions)
Freight revenue	$4,826	$4,689	$4,612
Passenger revenue	872	900	1,011
Mail revenue	152	104	98
Express revenue	150	143	145
All other revenue	354	342	339
Total	$6,354	$6,178	$6,205

Freight revenue showed the greatest amount of increase or $137,000,000, over 1928. Mail revenue increased by the greatest percentage, 46 per cent; but this increase is largely explained by a considerable amount of back mail pay received by the railways from the government during the year 1929. These back payments grew out of a decision of the Interstate Commerce Commission that was handed down in 1928, and was partially retroactive to 1925, but was held in suspense for final adjudication by the U. S. Supreme Court. The court decision was made early in 1929, and the suspended payments were thereupon voted by Congress and turned over to the railway companies.

Passenger revenue declined about three per cent, which was a somewhat greater fall than the reduction in passenger-miles. The revenue from passenger service fell below a billion dollars in 1927, for the first time in ten years, declined to $900,000,000 in 1928, and has now gone below the latter total.

Railway Operating Expenses

Operating expenses increased 1.3 per cent over 1928, but were 1.2 per cent under the annual average of the preceding five-year period. Table VIII summarizes the various items of operating expense in 1929, compared with 1928 and the five-year average.

Table VIII

OPERATING EXPENSES

	1929 (millions)	1928 (millions)	Average 1924-1928 (millions)
Maintenance of way	$ 861	$ 846	$ 846
Maintenance of equipment	1,207	1,175	1,248
Traffic	130	125	113
Transportation	2,102	2,097	2,165
General and other	238	230	222
Total	$4,538	$4,473	$4,594

Economy of operation is clearly indicated in this table. While there was a small increase over 1928, the principal cause may be found in the two maintenance accounts, where more than two-thirds of the total increase occurred. Transportation expenses remained virtually stationary. Compared with the five-year annual average to 1928, two of the three large accounts declined, despite a generally higher level of freight traffic and performance in 1929. The two maintenance accounts combined show a decrease of $26,000,000, while transportation expenses declined $63,000,000, under the five-year average. In short, the railways are continuing to keep their expenses of operation under control.

Receipts per Traffic Unit

Average receipts per ton-mile and per passenger-mile measure with approximate accuracy the price levels of the principal types of transportation service by rail. Of course, they must be considered in the light of various traffic factors: In the freight service, the character of the traffic, the proportion of low and high grade commodities, the length of haul; in the passenger serv-

ice, the proportion of commutation travel, of excursion travel, of travel at special rates.

Inasmuch as the proportion of coal, coke, and other bulk goods in the total traffic has been stationary or declining since 1921, while the proportion of manufactured products has been generally growing, the downward tsend in freight rates from 1921 to 1929 is probably understated rather than overstated by the trend in receipts per ton-mile.

This average of receipts per ton-mile has been virtually stationary during the past four years. The average for 1929 was 1.080 cents, and stood 15.3 per cent below 1921, the year when the general rate increases of 1920 had their most nearly complete effect.

Receipts per passenger mile averaged 2.820 cents in 1929, which was 1.1 per cent below 1928, and 8.6 per cent below 1921. This average has shown a consistent decline, year by year since 1921.

The averages, for the years 1921 to 1929, appear in Table IX.

Table IX

RECEIPTS PER TON-MILE AND PASSENGER-MILE, 1921-1928

	Receipts per ton-mile (cents)	Receipts per passenger-mile (cents)
1921	1.275	3.086
1922	1.177	3.027
1923	1.116	3.018
1924	1.116	2.978
1925	1.097	2.938
1926	1.081	2.936
1927	1.080	2.896
1928	1.081	2.850
1929	1.080	2.820

Capital Expenditures

Railway capital expenditures during the past seven years have aggregated nearly six billions of dollars. The annual expenditures have averaged about $830,000,000. The total for 1929 is estimated at not less than $800,000,000, and will probably exceed that figure.

Special reports have been made annually by the railways since 1923, covering their capital programs and their actual expenditures for capital purposes. The summarized results of these reports relate to gross expenditures, no allowance being made for amounts credited to the property account for retirements, abandonments, or adjustments. Totals for the seven years, 1923 to 1929, follow:

	Gross Capital Expenditures
1923	$1,059,149,000
1924	874,744,000
1925	748,191,000
1926	885,086,000
1927	771,552,000
1928	676,665,000
1929 (estimated)	800,000,000
Grand Total	$5,815,387,000

The railway capital program has somewhat the nature of a continuous project. As fast as new items are authorized—new equipment, new yards, new stations, or what not—the amounts they will represent in future expenditure enter the program, and remain there until the actual expenditures have been completed. Expenditures as made gradually drop out of the program. So the program as a whole is not unlike a reservoir, into which are flowing the new projects as authorized, and from which are deducted the expenditures as and when made.

To make this clear, let us consider a hypothetical example. Suppose a railway board of directors, on December 31, 1929, authorizes a yard improvement, to cost an estimated total of $5,000,000. The whole project at once enters the capital program, and remains there in whole or in part until completed. The total amount of $5,000,000 would be recorded on January 1, 1930, as an unexpended authorization brought over from the preceding year. Suppose that $3,000,000 of the total is expended during 1930, the balance of the project to be completed during 1931. The record for 1930 would then be: Capital program, $5,000,000; capital expenditures, $3,000,000; unexpended authorizations carried over to 1931, $2,000,000.

Unexpended authorizations brought over from 1928 into 1929 amounted to $372,000,000. Additional authorizations of $1,083,000,000 were voted during 1929. This made a grand total of $1,455,000,000 as the capital program of the railways in 1929. Capital expenditures during the year were $800,000,000, leaving a carry-over of $655,000,000 into 1930.

Of the capital expenditures of $800,000,000 in 1929, it is estimated that $300,000,000 was expended for equipment and $500,000,000 for roadway and structures.

The proportion of total capital expenditures going into equipment declined steadily each year from 1923 to 1928, dropping from 64 per cent in 1923 to 33 per cent in 1928. It rose again to 37 per cent in 1929. For the seven years, the percentage distribution was 46 per cent to equipment and 54 per cent to roadway and structures.

Every phase of the capital program of 1929 was greater in amount than in 1928. The unexpended authorizations brought over from the preceding year were greater in 1929 by $52,000,000. Additional authorizations during 1929 were greater by about $330,000,000. The total capital program for the year thus exceeded that of 1928 by some $380,000,000. Expenditures were greater by about $125,000,000, leaving $255,000,000 more to be carried over into 1930 than was brought over into 1929.

The prospect for 1930 is a larger program than in 1929. Not only is a larger unexpended authorization being carried over, but preliminary inquiries made by the Bureau of Railway Economics for the National Business Survey Conference of December 5 indicated larger expenditures. The total capital program for 1930 will be considerably in excess of a billion dollars. Expenditures for the first six months of the year are estimated at $490,000,000, an increase of $140,000,000 over the first six months of 1929.

This is one of the contributions of the railway industry toward stabilization, following the financial upset of the final quarter of 1929.

New Equipment

Locomotive and car orders and installations were generally greater in 1929 than in 1928. For the first ten months, 1,377 locomotives were installed in 1929 and 1,190 in 1928. Corresponding totals for freight cars were 70,968 in 1929 and 47,434 in 1928. Passenger car installations for nine months aggregated 2,020 in 1929 and 1,594 in 1928. In addition, 2,763 railroad-owned, but privately controlled, refrigerator cars were installed to November 1.

Retirements during the first ten months of 1929 amounted to 2,882 locomotives, 2,620 passenger cars (nine months), 86,846 freight cars, and 1,792 railroad owned and privately controlled refrigerators.

Although a greater number of locomotives and freight cars were retired than were installed during 1929, the greater power (or capacity) of the new units went a long way toward offsetting the losses from retirement. In the case of locomotives, although more than twice as many units were retired as were installed, the average tractive force per unit was 52,377 pounds for the new engines, and 32,510 pounds for those retired. The aggregate gain in tractive force was thus 72,123,000

pounds, while the aggregate loss was 93,694,000 pounds, the net loss being 21,571,000 pounds.

In the case of the freight cars, the retirement loss in capacity was more than made up. Although 15,878 more freight cars were retired than installed during the first ten months, the new cars averaged 50.6 tons of unit capacity, whereas the retired cars averaged only 40.9 tons. The aggregate gain in capacity was thus 3,591,000 tons, while the aggregate loss was 3,552,000, the net gain being 39,000 tons.

Unfilled orders for locomotives and freight cars at or near the close of 1929 showed a considerable increase over 1928, this fact also foreshadowing an increased capital program for 1930. Locomotives on order at the end of October numbered 294, compared with 121 on the same date in 1928, while the number of freight cars on order was 33,123, compared with 5,437 in 1928. Passenger cars on order were 681 on September 30, 1929, and 1,173 on September 30, 1928.

Railway Employees

Number of employees on railway payrolls averaged 1,685,000, during 1929, compared with 1,680,000 in 1928. This was an increase of 0.3 per cent.

Their aggregate compensation was slightly greater than in 1928, the comparative figures being about $3,000,000,000 in 1929 and $2,862,000,000 in 1928. Compensation thus increased about five per cent, compared with an increase of 0.3 per cent in number of employees.

Average compensation per employee has been rising gradually each year since 1924. While this average is affected to some extent by the percentage distribution of the total number of employees among the respective classes, the consistent rise of the past five years has been due primarily to upward adjustments in the wage rates of some of the classes, either locally on individual railway lines or in certain of the territories.

The average railway employee received $1,780 in compensation during the year 1929, compared with $1,703 in 1928 and $1,613 in 1924. This was an increase of 4½ per cent over 1928, and ten per cent over 1924.

Had railway employees received the same average annual compensation in 1929 as they earned in 1928, the total payroll of the railways for 1929 would have been approximately $130,000,000 less than it was. In other words, the railway payroll increased by that amount in 1929, due to increased earnings per employee.

Railway Operating Efficiency

The railways attained another high level of operating performance in 1929. This was on top of progressive improvement in general efficiency each year since 1922.

In addition, no less than twelve separate factors of efficiency reached new high levels during the year. These will be discussed first, followed by the presentation of an index of railway operating efficiency.

The twelve factors appear below, together with the averages they attained during the first ten months of 1929. In each case the average shown is a record achievement for the period.

OPERATING RECORDS IN 1929 (TEN MONTHS)

1.	Freight car-miles per car-day	32.8
2.	Net ton-miles per car-day	557
3.	Gross tons per freight train	1,877
4.	Net tons per freight train	812
5.	Gross ton-miles per freight train-hour	24,628
6.	Net ton-miles per freight train-hour	10,653
7.	Freight train speed (M.P.H.)	13.1
8.	Locomotive miles per locomotive day (freight)	65.6
9.	Fuel consumption per unit (lb. per 1000 G.T.M.—freight)	123
10.	Locomotive-miles per locomotive-day (passenger)	120.1
11.	Percentage serviceable locomotives (passenger)	83.8
12.	Fuel consumption per unit (lb. per P.T.C.M.—passenger)	14.7

Some of these factors will receive more detailed analysis at a later point in this review; they are here brought together to supply a concentrated picture of the many elements of operation which in 1929 surpassed all previous records.

In addition, the railways handled more freight cars and more passenger cars per train in 1929 than in any preceding year. These factors are not so definitely

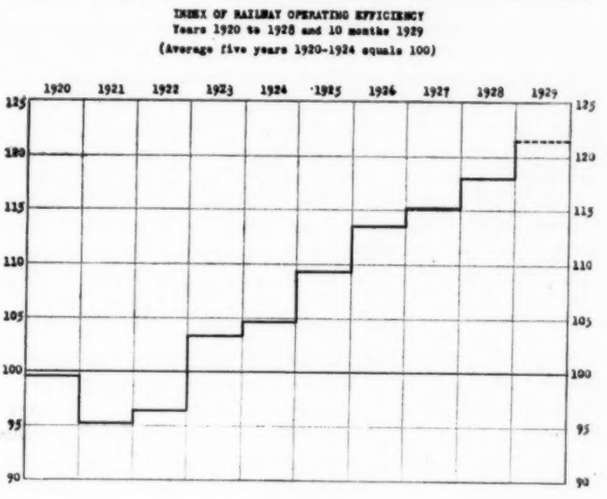


Chart C

measures of efficiency as the twelve listed above, but they carry significance nevertheless.

To bring various efficiency factors together into a single index, so as to measure the progressive improvement of the railways is not easy. One method is to relate each efficiency factor on a percentage basis to its own previous level, then to combine the several indexes so computed for each factor into a common index.

Chart C results from such a computation. It combines the index numbers of thirteen efficiency factors, for each of which a separate index has been made, using the average of the five years from 1920 to 1924 as a base, or 100 per cent. A simple average of the thirteen individual indexes is then computed and becomes a general index of railway efficiency. Such an index is shown in the chart for each year from 1920 to 1929.

Beginning with a slight improvement in 1922 over 1921, the chart shows a consistent improvement in every succeeding year. The greatest relative progress occurred in 1923, when the railway program for greater operating efficiency went into effect. Excellent progress was made also in 1925, in 1926, and in 1929. The index level for 1929 stood higher than in any previous year, the average for ten months being 21.5 per cent above the corresponding base period average (1920 to 1924), and nearly three per cent over 1928.

The efficiency averages for the seven years from 1923 to 1929 were as follows:

1923	103.4
1924	104.8
1925	109.4
1926	113.5
1927	115.2
1928	118.1
1929	121.5

The thirteen factors combined to form this index of railway efficiency are given below. Ten of the factors apply to freight service, and three to the passenger service, as indicated.

1. Freight car-miles per car-day.
2. Net ton-miles per car-day.
3. Gross tons per freight train.
4. Net tons per freight train.
5. Gross ton-miles per freight train-hour.
6. Net ton-miles per freight train-hour.

7. Locomotive-miles per locomotive-day. (freight)
8. Locomotive-miles per locomotive-day. (passenger)
9. Percentage serviceable locomotives. (freight)
10. Percentage serviceable locomotives. (passenger)
11. Percentage serviceable freight cars.
12. Fuel consumption per unit. (freight)
13. Fuel consumption per unit. (passenger)

These thirteen factors of railway performance supply measures of various elements of efficiency, such as locomotive speed, train loading, car movement, physical condition of equipment, and fuel utilization. The index may be regarded as a fairly definitive, even if not a perfect, gage of effective performance. It may be that other factors—such as freight train speed—should be included. It may be that one or more of the factors now included could be eliminated. Any such modifications would change the percentage index slightly, but would not modify the steady upward trend in operating efficiency since 1921, as set out in the chart and the accompanying table.

Reserve Equipment

Much of the growth in effectiveness of operation during the past few years has been due to the input of new capital, which has furnished a better plant, better machines, and better tools with which to conduct the various services. The nearly six billions of gross capital expenditures poured into the railway plant from 1923 to 1929 goes far toward explaining the rising index of efficiency. That these capital expenditures will continue into 1930, and that railway managements are not in the least relaxing their determination to attain even greater efficiency and economy, augurs for further rise in the index in the future.

A considerable part of the new capital has gone into new, enlarged, and improved equipment. This has made it possible to operate with fewer units, to maintain the existing equipment in better physical condition, to handle cars more effectively, and to keep on hand a substantial reserve of motive power in the shape of locomotives, and freight moving capacity in the shape of freight cars.

Tables X and XI summarize the reserve equipment situation. Table X shows, as of the first of each month, the number of stored locomotives. Table XI corresponds to Table X, and relates to surplus freight cars. Each table compares 1929 with 1928 and with the five-year average to 1928.

Locomotives reported as stored are in good physical condition, and are considered potentially ready for service. Locomotives in bad order and undergoing or awaiting shopping are not included. The same is true of freight cars reported as surplus.

Table X

NUMBER OF STORED SERVICEABLE LOCOMOTIVES, FIRST DAY OF EACH MONTH

	1929	1928	Average 1924-1928
January	6,482	7,490	5,433
February	5,497	7,307	5,071
March	5,132	7,180	5,186
April	5,866	7,276	5,865
May	5,675	7,136	6,408
June	5,690	7,161	6,535
July	5,411	7,117	6,582
August	5,306	6,982	6,551
September	4,947	6,504	6,160
October	4,500	5,661	5,364
November	4,041	4,958	4,761
December	5,313	5,560	5,173
Year	5,272	6,611	5,757

The number of stored locomotives in 1929 ranged from a minimum of 4,006 on October 15 to a maximum of 6,482 on January 1. This range was a smaller one than in 1928, the maximum being lower in 1929, and the minimum higher, than the corresponding extremes of 1928, which were 4,958 and 7,490 stored locomotives, respectively.

Stored locomotives averaged 5,272 in 1929, compared with 6,611 in 1928, and an average of 5,757 for the five-year period. Thus the average for 1929 was below that of the previous five years, and considerably below that of 1928. On the other hand, it must be kept in mind that the total number of units of motive power in service has been declining, that the number declined also from 1928 to 1929, and that the reserve in 1929 was more than adequate to protect the service at all times during the year. As is usually the case, the reserve declined with the greater traffic of the latter months of the year, but increased sharply in December.

STORED SERVICEABLE LOCOMOTIVES, ON FIRST OF EACH MONTH
(5 year average 1924-1928, and years 1928 and 1929)

Chart D

Chart D is a graphic statement corresponding to Table X. The curve for 1929 ran generally downward, was at all times below the curve for 1928, and as it declined crossed the five-year curve in April.

Table XI deals with the number of freight cars reported as surplus, during the first week of each month in 1929, 1928, and the average for five years.

Table XI

FREIGHT CAR SURPLUS FIRST WEEK OF EACH MONTH

	1929	1928	Average 1924-1928
January	411,320	461,669	346,623
February	245,907	369,469	240,977
March	225,965	352,854	269,352
April	271,353	344,731	299,205
May	203,467	301,897	294,404
June	242,411	318,370	307,760
July	204,308	332,317	304,961
August	180,954	257,212	245,255
September	157,606	188,795	169,380
October	111,458	92,203	114,938
November	163,323	129,151	129,091
December	360,247	256,995	235,134
Year	222,705	281,510	246,423

Surplus freight cars in 1929 hanged from a minimum of 107,301 in October, to a maximum of 411,320 in January. The minimum was higher, and the maximum lower, than in 1928; in other words, the range was a narrower one in 1929. The average number of surplus cars in 1929 was 222,705, compared with 281,510 cars in 1928, and 246,423 cars during the preceding five years.

The average for 1929 thus ran below the averages both for 1928 and the five years.

The graphic form of Table XI appears in Chart E. As in the case of locomotives, the curve sloped generally downward in 1929, but turned upward in November and December. The curve for 1929 ran almost consistently below that for 1928 and the five-year average to October, then remained consistently above. This mirrors the freight traffic drop of the last three months of the year.

Reports of freight car shortage, like those of surplus cars, are made four times per month. Of 45 compilations so made, to December 8, 1929, nine showed no shortage whatever. The largest shortage reported at any time in 1929 was 626 cars. During the balance of the year, there were either no shortages or they were merely nominal.

The average car shortage was 70 cars in 1929, compard with averages of 42 cars in 1928, 169 cars in 1927,

AVERAGE DAILY FREIGHT CAR SURPLUS, FIRST WEEK OF EACH MONTH
(5 year average 1924-1928, and years 1928 and 1929)

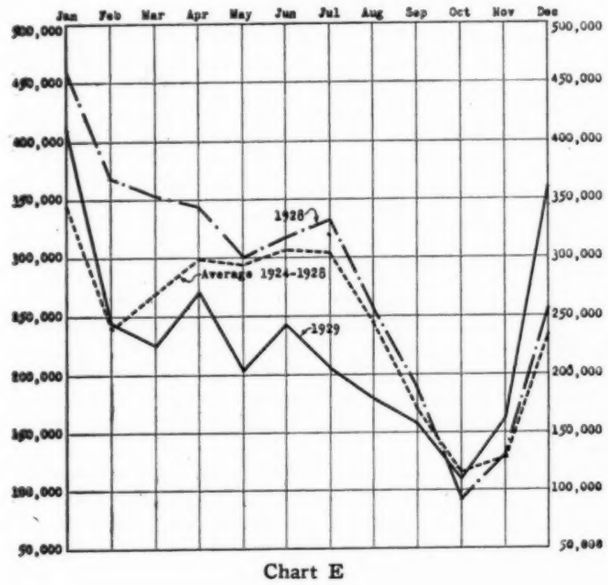


Chart E

and 286 cars in 1926. While the average turned slightly upward in 1929, it was still so small as to support the statement already quoted from the Secretary of Commerce, that "shortages of cars have now become rare occurrences."

Physical Condition of Equipment

The improved physical condition of railway equipment, and its contribution to efficiency, has already been mentioned. Chart F outlines the proportion of motive power and freight cars reported serviceable each month. The lower half of the chart shows the percentage of locomotives in serviceable condition during 1929, compared with 1928 and the five-year average. The upper half consists of similar curves for freight cars.

The curve of serviceable locomotives in 1929 ran generally above that for 1928, and considerably above the five-year average. The best showing was made in September, when the percentage reached 87.5 per cent, the best average attained since the war. It will be recalled that the railways in 1923 set 85 per cent as their goal for serviceability of locomotives. This goal was surpassed during every month of 1928 and 1929, the annual averages being 85.6 per cent in 1928 and 85.9 per cent in 1929.

PERCENTAGE OF FREIGHT CARS IN SERVICEABLE CONDITION, BY MONTHS
AND
PERCENTAGE OF LOCOMOTIVES IN SERVICEABLE CONDITION ON FIRST OF EACH MONTH
(5 year average 1924-1928, and years 1928 and 1929)

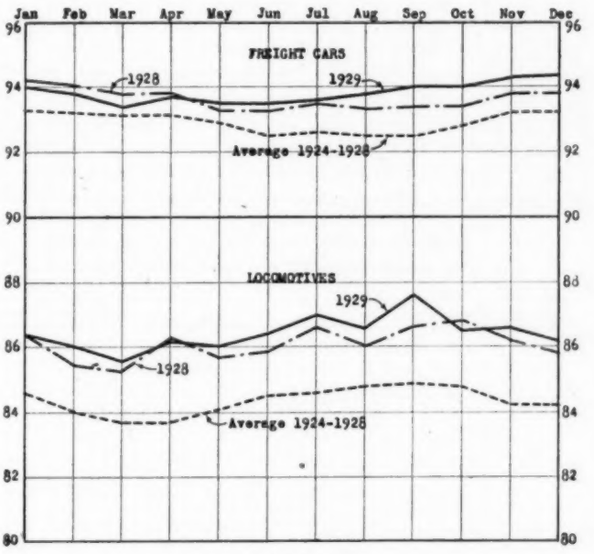


Chart F

Freight car condition averaged slightly above that of 1928, and well above the five years. The curve for 1929 ran below 1928 to April, and above for the balance of the year. The goal set by the railways in 1923 was 95 per cent. The averages attained in 1928 and 1929 were 93.6 per cent and 93.8 per cent, respectively.

The curves in Chart F are based on reports compiled by the Car Service Division. Statistics issued monthly by the Interstate Commerce Commission tell a similar story. During each month of 1929, the percentage of serviceable locomotives was higher than in the corresponding month of 1928. Freight car serviceability failed to surpass 1928 in every month, although the average was above 1928, and considerably above all other preceding years.

Freight Car Movement

Table XII presents statistics as to the average number of miles per freight car per day, covering each month of 1929, 1928, and the five year average.

Table XII

MILES PER FREIGHT CAR PER DAY, BY MONTHS

	1929	1928	Average 1924-1928
January	29.5	27.6	27.0
February	32.4	29.8	28.6
March	32.3	30.9	28.9
April	32.0	29.9	28.1
May	32.9	31.1	28.9
June	32.4	30.3	28.6
July	32.1	30.3	28.6
August	33.5	32.1	30.1
September	34.2	33.8	31.7
October	36.3	36.2	33.6
November	...	33.3	31.0
December	...	29.6	27.9
Year	...	31.3	29.5

Average daily movement per freight car, in miles, was greater in each of the first ten months of 1929 than during the corresponding months of 1928. Nine of the ten months surpassed an average of 30 miles per day, a record level of 36.3 miles being reached in October. The composite average for the ten months was 32.8 miles, or 1.6 miles above the previous year. Again, as in 1928, the 30-mile goal set by the railways as their program in 1923 was surpassed. Compared with the five-year average, the returns for 1929 were higher in

every month. Table XII presents the comparative statistics, by months, for 1929, 1928, and the five years.

The ten-month average for 1929 was five per cent above that for 1928, and the annual average for 1928 was in turn more than six per cent above the five-year average. Consistent progress in this very important factor of efficiency is thus indicated.

Chart G graphically illustrates this fact. Every month of 1929 registers an advance over 1928, and a still greater advance over the five-year average movement.

Statistics of freight car movement, such as appear in Table XII and form the basis of Chart G, are computed by dividing the total number of freight car-miles by the

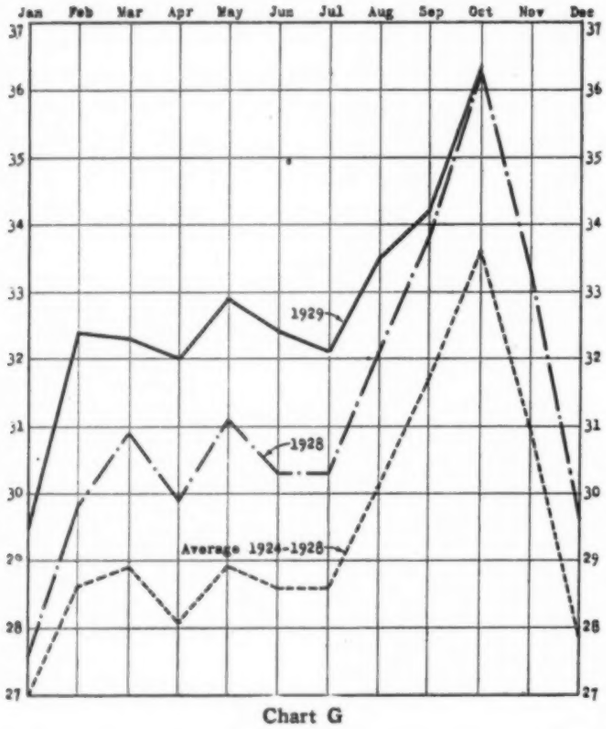


Chart G

total number of freight cars in service, including idle or surplus cars, cars in or awaiting shop, and cars in the hands of shippers for loading and unloading. Such an average does not indicate the movement of freight cars while actually in motion, but merely represents the average number of miles made each calendar day in the year by all cars in the railway service on that day. It does not indicate the average movement of cars per hour or per day when in actual motion.

When in a train and in motion, a freight car travels at the same speed as the train. Stated differently, average freight train speed is also the speed at which the average freight car moves while under way. Freight train speed broke all records in 1929, attaining an average of 13.1 miles per hour. This was three-tenths of a mile greater than in 1928, an improvement of more than two per cent. Compared with 1923, this significant efficiency factor increased 21 per cent.

The total movement of a moving freight car in the course of a day may be computed by multiplying the 13.1 miles of train speed per hour by 24, which gives a result of 314.4 miles. This represents the daily movement of freight cars while in a moving train, and gives a very different picture from what is gained when it is stated that the average daily movement of all freight cars—including those at rest and in shop—was 31 miles per day.

Locomotive Movement

Average locomotive-miles per day are computed, as in the case of freight cars, by dividing total locomotive-miles by the total number of locomotives in service, including those in storage, in shop, or awaiting shop. This average also fails to indicate the actual speed at which a locomotive travels while in motion, yet it offers a comparative measure of the average service rendered by all locomotives considered as a reservoir of motive power.

This section deals with the average number of miles per locomotive day. Table XIII gives the detailed statistics for freight locomotives, while the performance of passenger locomotives is discussed in the text following the table.

Table XIII

LOCOMOTIVE MILES PER FREIGHT LOCOMOTIVE DAY

	1929	1928	Average 1924-1928
January	62.6	57.6	58.5
February	66.9	59.6	59.8
March	63.8	60.5	58.7
April	63.2	58.2	56.6
May	64.4	60.1	57.2
June	64.0	59.2	56.8
July	64.6	59.5	57.0
August	66.7	62.5	59.3
September	67.7	65.4	62.8
October	72.2	69.8	66.1
November	...	65.1	62.4
December	...	59.7	59.3
Year	...	61.5	59.6

The average movement of freight locomotives, for ten months of 1929, was 65.6 miles per day, compared with 61.3 miles in 1928. Every month of 1929 showed improvement over 1928, and over the five-year average as well. The average reported for October—72.2 miles per day—was greater than in any single month in any preceding year.

The improvement over 1928 ranged from a minimum of 2.3 miles in September to a mixmum of 7.3 miles in February. Only three of the twelve months of the average five-year period showed a movement in excess of 60 miles per day. Six of the twelve months of 1928 surpassed 60 miles. Every month of 1929 was above that figure, and one month broke above 70 miles for the first time on record.

Locomotive-miles per freight locomotive day are computed on a basis that includes locomotives in or awaiting shop, and stored locomotives. These statistics would more nearly state the facts as to actual locomotive movement if stored and unserviceable locomotives were excluded from the computation, thus placing it on the basis of what may be termed "active" locomotives only. Revised to such a basis, the average number of miles per freight locomotive day in 1929 was 91.6 miles, compared with 88.2 miles in 1928 and the record or peak average attained in October was 96.0 miles. On either basis of computation, it is clear that freight locomotive movement in 1929 reached record levels.

As was the case in 1928, passenger locomotive performance in 1929 also broke all existing records. Average miles per passenger locomotive day in 1929 was 120.1 miles, compared with 114.6 miles in 1928. Revising this average to an "active" basis, as in the case of freight locomotives, by eliminating stored and unserviceable passenger locomotives, the average movement for 1929 becomes 164.5 miles per day, compared with 158.4 miles in 1928. Using either basis of computation,

the performance of 1929 shows a forward step beyond the records attained in 1928.

Average Train Load

The railways broke another record in 1929, this time with respect to average load per freight train. Table XIV presents statistics of net tons per train, for each month of 1929, 1928, and the five-year period.

Table XIV

NET TONS PER TRAIN

	1929	1928	Average 1924-1928
January	767	747	718
February	779	758	739
March	777	775	742
April	776	758	726
May	817	784	760
June	827	784	760
July	818	794	766
August	855	822	800
September	856	842	803
October	843	842	801
November	...	814	772
December	...	768	726
Year	...	793	760

Every month in 1929 reported a greater average load per freight train than in 1928, and by a larger margin was above the five-year average. The average trainload for 1929 (ten months) was 812 tons, which was an increase of 20 tons, or 2.5 per cent over 1928.

Chart H clearly brings out the superiority of 1929 performance, as regards the average freight train load.

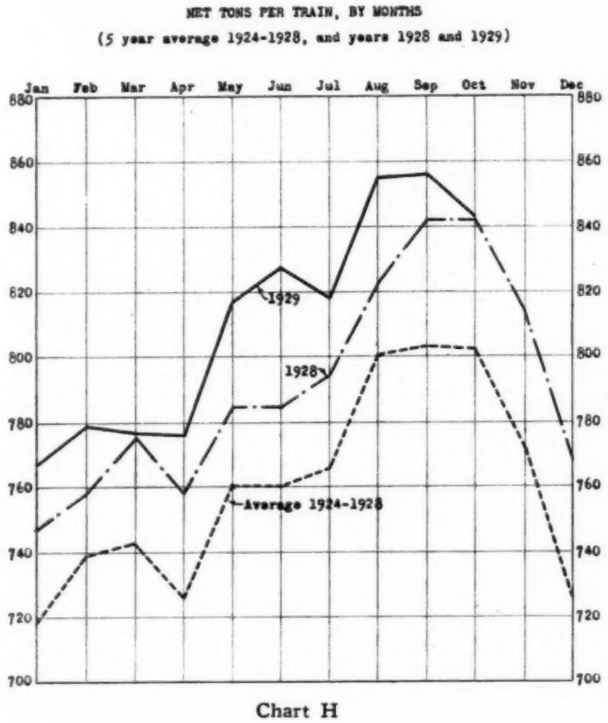


Chart H

The number of freight cars per train was 48.8 cars in 1929, compared with 48.1 cars in 1928.

Average Car Load

The average load per freight car during the first ten months of 1929 was slightly higher than in 1928. Comparative statistics are 26.8 tons per car in 1929, compared with 26.6 tons in 1928. Table XV gives the figures, and shows that eight of the first ten months of 1929 ran above or equaled the corresponding months of 1928, while the other two months were below. The 1929 average, as stated, was slightly in excess of that for 1928, but was slightly below the five-year average.

Table XV

NET TONS PER LOADED CAR

	1929	1928	Average 1924-1928
January	27.4	27.2	27.8
February	27.3	26.6	27.3
March	25.8	26.1	26.5
April	25.6	25.6	25.9
May	26.7	26.3	26.7
June	26.7	26.3	26.8
July	27.3	26.6	27.0
August	27.5	27.2	27.5
September	27.1	26.7	27.0
October	26.9	27.0	26.9
November	...	27.4	27.4
December	...	27.5	27.7
Year	...	26.7	27.1

Heavier loading of freight cars is a responsibility that rests, in large part, on the shoulders of the shippers. Many shippers have been cooperating with the railways in a campaign to increase the carload, and thus to reduce unnecessary movement of cars and locomotives. The average still remains considerably below the goal of 30 tons per car, which formed a part of the 1923 efficiency program.

Net Ton-Miles per Car-Day

Still another record was made in a factor that is a composite of average carload and speed of car movement. This is the average net ton-miles per freight car-day. Table XVI presents these statistics, by months, for 1929, 1928, and the five year average.

Table XVI

TON-MILES PER CAR-DAY

	1929	1928	Average 1924-1928
January	513	470	475
February	554	496	501
March	528	513	495
April	521	482	466
May	551	511	491
June	549	501	488
July	548	507	490
August	585	549	529
September	594	586	559
October	623	627	587
November	...	568	535
December	...	493	477
Year	...	526	508

The average for the first ten months of 1929 was 557 ton-miles per car-day, which was 33 miles above the corresponding average for 1928. This comprised a relative improvement of six per cent over 1928, and nearly ten per cent over the five-year average. Except for the month of October, when 1928 made an unusually good showing, every month of 1929 was above the corresponding month of 1928, the spread being as great as 58 ton-miles in February.

Ton-Miles per Train-Hour

Records were also established by the railways in 1929, with regard to ton-miles per freight train-hour. This factor is compiled on two bases: Gross ton-miles and net ton-miles. The former is perhaps a better measure of operating efficiency from the railway point of view, while the latter is of greater interest to the public. Net ton-miles exclude, while gross ton-miles include, the tare weight of the freight car. Table XVII presents statistics of net ton-miles per freight train-hour, by months, in 1929, 1928, and the five years averaged.

As in 1928, it was again the case in 1929, that every record was broken during the year. The peak performance for a single month was raised to 11,175 net ton-miles per train-hour in September; this is 4.4 per cent above the previous record of 10,707 ton-miles per train-hour, set up in the same month of 1928. The average for ten months of 1929 was 10,653 ton-miles, compared with 10,167 ton-miles in 1928. Every month of 1929

(except June) reported an increase over 1928, and by considerable margins.

Table XVII

NET TON-MILES PER TRAIN-HOUR

	1929	1928	Average 1924-1928
January	9,901	9,453	8,439
February	9,971	9,655	8,721
March	10,177	9,888	8,903
April	10,296	9,801	8,879
May	10,865	10,251	9,430
June	10,068	10,258	9,425
July	10,934	10,425	9,505
August	11,170	10,479	9,691
September	11,175	10,707	9,644
October	10.936	10,612	9,592
November	.....	10,421	9,271
December	.....	10.133	8.794
Year	.....	10,205	9,197

Two factors enter into this average: Freight train speed per hour and tons of load per train. Both these factors broke all records in 1929; ton-miles per train hour were bound to follow suit.

Chart I is a curve of net ton-miles per train-hour for each month of 1929, compared with 1928 and with the five-year average.

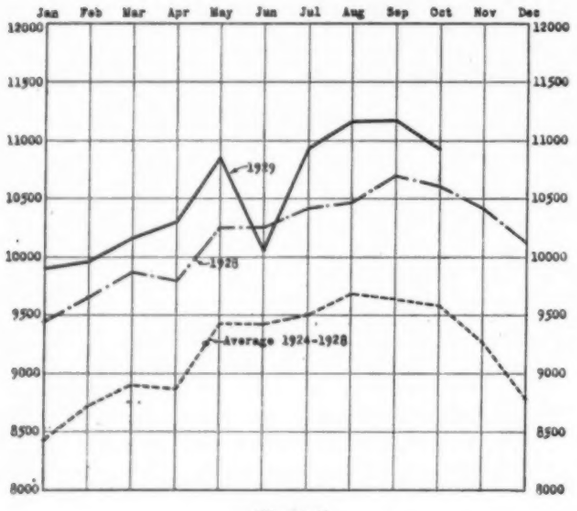


Chart I

The curve runs above that for 1928 at all points except June, when a sharp dip occurred, and was considerably above the five-year average in every month.

Gross ton-miles per freight train-hour also broke all records. Without repeating the details, which are similar to those already presented for net ton-miles per train-hour, it may be said that gross ton-miles per train-hour surpassed previous records for each month, for any one single month, and for the year as a whole. The average for ten months of 1929 was 24,628 gross ton-miles per train-hour, compared with 23,571 ton-miles in 1928, an increase of 4.5 per cent. This compares with a rise of 4.4 per cent in net ton-miles per train-hour.

Fuel Conservation

New records were also established in 1929 with respect to fuel consumption by locomotives, both in the freight and the passenger service.

Table XVIII presents statistics of average consumption of fuel in the freight service, stated in terms of pounds of fuel per 1,000 gross ton-miles, for each month of 1929, 1928, and the five-year period.

Nine of the ten months shown for 1929 reported lower consumption averages than for 1928. February is the sole exception. The averages for these nine months were the lowest—that is, the best achievements on record for those months. The average for ten months of 1929 was 123 pounds per 1,000 gross ton-miles, compared with 125 pounds in 1928. The low figure of 112 pounds per 1,000 gross ton-miles reported in August broke the record for any single month.

Table XVIII

POUNDS OF FUEL PER 1,000 GROSS TON-MILES (INCLUDING LOCOMOTIVE AND TENDER)

	1929	1928	Average 1924-1928
January	144	145	160
February	143	141	152
March	131	134	146
April	124	131	138
May	119	121	130
June	114	118	125
July	113	115	123
August	112	115	122
September	116	122	130
October	121	122	130
November	...	130	141
December	...	137	152
Year	...	127	137

Corresponding statistics of fuel consumption per 1,000 gross-ton-miles (including locomotive and tender weight) are available back to 1921. In that year, the average was 162 pounds. Every succeeding year has shown improvement, the average for 1929 being 31.7 per cent below that for 1921. This marks nearly a one-third saving in fuel consumption in the freight service, due to more efficient and economical purchasing and handling methods.

Locomotive fuel consumption in the passenger service is covered by Table XIX.

Table XIX

POUNDS OF FUEL PER PASSENGER TRAIN CAR-MILE

	1929	1928	Average 1924-1928
January	16.8	16.9	18.0
February	16.7	16.5	17.6
March	15.5	15.9	17.0
April	14.6	15.3	16.0
May	14.3	14.5	15.3
June	13.7	14.0	14.7
July	13.5	13.7	14.4
August	13.4	13.8	14.4
September	13.9	14.2	14.7
October	14.7	14.6	15.4
November	...	15.4	16.2
December	...	15.7	16.9
Year	...	15.0	15.9

Fuel consumption in the passenger service was also on a record-breaking basis in 1929. In eight months of the ten the average for 1929 was lower than for 1928; every month was below the five-year average. The average of 13.4 pounds per passenger train car-mile reported for August was a better showing than for any single month of record. The ten-month average was 14.7 pounds in 1929, compared with 14.9 pounds in 1929. This too was a record.

Conclusion

This review of railway operations in 1929 has brought out points both of parallelism with, and variation from, other years.

Freight traffic, as in the preceding three years, was on a high level. Its trend differed sharply from that of 1928, however, in that the curve of comparison with the next preceding year ran generally downward, whereas in 1928 it was consistently on an upward incline. The trends for 1927 and 1929 were more nearly parallel, although the curve for 1929 was on a higher level throughout.

Taking the traffic as a whole, the ton-mile aggregate for 1929 was above that for both 1927 and 1928, and slightly exceeded 1926. Carloadings were also above

(Continued on page 118)

Outstanding Improvements in Service Characterize 1929

One of the Transcontinental Trains Pauses to Give the Passengers a View

Faster time, new trains, added comforts and air-rail combinations are year's features

By Charles Layng
Transportation Editor, *Railway Age*

WHILE the improvements in railway passenger service during 1928 were outstanding, the year 1929 witnessed even greater progress along this line. The time between terminals was shortened in many instances, new trains were put on and existing trains were re-equipped. Two outstanding developments were the further extension of all-day-coach train service and the growth of air-rail service. While there were a few such services in operation during the closing months of 1928, it may be said that 1929 witnessed the real beginning of the air-rail service on an extensive scale.

Freight service improvements kept up the pace which has been maintained for the past several years. The year was marked by a continued tightening up of perishable schedules, by large expenditures for new perishable handling facilities, and by a continued improved service in the on-time record of freight trains.

In general, during the last few years, only the railways in the eastern group have been showing any net earnings from passenger traffic, the southern group breaking about even, and the western group losing money. The difference in the results in these territories is explainable in large measure by the variation in density of population.

But, studying the railways with reference to their geographical grouping is not always an accurate measure. This is borne out by the statistics for 1929. Passenger traffic continued to decrease, although the decline was smaller than in any year since 1920, except 1925. Despite the general decline, certain roads are showing increased earnings this year over last, and these roads are not confined to the geographical limits of the eastern group by any means. It is interesting to observe that practically all of the roads showing increases are those which have made some outstanding improvement in the speed or equipment of their trains. Handicaps of various kinds hamper certain roads in securing passenger business, but it appears that in several instances, at least, success in procuring passenger traffic is in direct ratio to the amount of thought and effort put forth to give the passenger a fast, comfortable, and not too expensive, ride.

Passenger Service Improvements

Speed is becoming a more and more important factor in the competition for passenger traffic between the railways and other forms of transportation. Several highly important reductions in running time were made during the year. The Chicago-Pacific Coast lines were particularly active in this regard. In June, 1929, the lines serving the Pacific Northwest made a 6 hr. 45 min. reduction in running time from and to Chicago. This outstanding improvement was participated in by the Chicago, Milwaukee, St. Paul & Pacific; the Chicago & North Western-Union Pacific; and the Chicago, Burlington & Quincy in connection with both the Great Northern and the Northern Pacific

In the same month, both the Santa Fe and the Union Pacific reduced the running time of their extra fare trains between the Pacific Coast and Chicago from the the previous schedules of 63 hr. westbound and 61 hr. 15 eastbound, to 58 hr. in each direction. At the same time the schedules of the fast regular fare trains were

reduced from 68 hr. to the former schedule of the extra fare trains, namely, 63 hr. westbound and 61 hr. 15 min. eastbound. The Canadian Pacific cut ten hours off the running time of its trains between Montreal and Vancouver, reducing the schedule from 108 hr. to 98 hr.

Other improvements in the western schedules include a reduction of 1 hr. 35 min., from 27 hr. 25 min. to 25 hr. 50 min., between Chicago and Denver, participated in by the Union Pacific, the Burlington, the Rock Island and the Santa Fe, while the Great Northern established a new train between Seattle and Spokane to give passengers a daylight view of the Cascade mountains and the Cascade Tunnel.

The Chicago-New York lines also made notable improvements in the service between those cities. Instead of one 20-hr. train each day, in each direction, both the New York Central and the Pennsylvania have put on fleets of such trains, until there are now 17 of them in operation daily including one in each direction operated by the Michigan Central, in connection with the N.Y.C. east of the Suspension Bridge, N. Y. In addition, these lines have shortened the schedules of several other trains to 21 hr. or less. The New York, Chicago & St. Louis and the Erie put on new fast trains between Chicago and New York, while the running time was reduced on certain trains on practically all of the other lines serving both cities. Both the Broadway Limited of the Pennsylvania and the Twentieth Century Limited of the N.Y.C. were operated on daylight saving time this year for the first time during the summer, for the convenience of business men.

Reductions were also made in the running time of trains between the following terminals:

New York and Cincinnati
New York and St. Louis
New York and Buffalo
New York and Wilkes-Barre
New York and Boston
New York and Cleveland
New York and Utica
New York and New Orleans
New York and Birmingham
Pittsburgh and St. Louis
Pittsburgh and Philadelphia
Chicago and Pittsburgh
Chicago and Washington
Chicago and St. Paul-Minneapolis
Chicago and Louisville
Kansas City and Detroit
St. Louis and St. Paul-Minneapolis

Service to the Southwest and Mexico was also bettered, there being schedule reductions ranging from one to four hours between the following points:

St. Louis and Wichita
St. Louis and Oklahoma points
St. Louis and Texas points
St. Louis and Mexico City
Los Angeles and Mexico City
Kansas City and Tulsa

The running times to Florida for the winter season have also been improved by schedule reductions and closer connections between Montreal, New England points, New York and Chicago to the various winter resorts in Florida.

The wholesale reductions in running time made this year, taken in conjunction with those of last year, represent a greater and more widespread and permanent increase in the speed of passenger trains in the two years than took place in any five-year period previously in this century. It is now possible to get from many business centers to many others in from one to ten hours less time than was required in 1926.

Equipment Improvements

Realizing that increased comfort represents a selling point of probably equal importance with increased speed, many of the railways, during the past year, redoubled their efforts to provide comfortable and even luxurious appointments on their through passenger trains.

The spread of the solarium observation cars and of the so-called "overnight" single-room sleeping cars was marked in 1929, many trains being newly equipped with this type of car. The number of cars equipped with roller bearings also showed an increase, the total figure at present being 1,579 cars. The use of special types of glass in observation car windows also developed rapidly during the year, while the platform of the observation car of the new train, "The Senator", between Boston and Washington, represents a distinct departure in design, being built to resemble the veranda of a summer hotel. Several lounge cars of new design have also been placed in service.

A new departure on the Cascade Limited of the Southern Pacific is an inter-car telephone system, whereby passengers may telephone to each other while in different cars, call up the barber to see if he is busy, or the dining car steward to find out if seats are available.

A number of trains were completely re-equipped with cars of the latest design. These include the Golden State Limited, the Rocky Mountain Limited and the Iowa-Nebraska Limited on the Rock Island, the Crescent Limited of the Pennsylvania-Southern-Atlanta & West Point-Louisville & Nashville, the Mountaineer of the Soo Line-Canadian Pacific and many others wholly or partially re-quipped. With the new trains put on and the trains re-equipped last year, this fleet of trains throughout the country represents an amazing increase in travel luxury over two or three years ago.

Auto Baggage

The Southern Pacific continued its practice, started last year, of handling automobiles as baggage, in specially-built cars, on the same train with the passengers owning the automobiles. New services were established between Sacramento and Reno, 154 miles, over the Sierra Nevadas, and between Wells, Nev., and Ogden, Utah. The Reno service enables automobile tourists to cross the mountains in comfort, when the passes are blocked by snow, and eliminates the necessity for the arduous mountain driving at any season of the year. This service was originally established on a tri-weekly basis, but, after only one month's operation, it proved so popular that daily service was put on. The Wells-Ogden service enables the tourists to avoid a 234-mille drive around Salt Lake and across the desert.

Southern lines are investigating the possibilities of a similar service and, in a recently issued tariff, rates are published covering the handling of automobiles as baggage between Washington, D. C., Ohio river points and Florida. Following this, the Illinois Central put in a schedule of especially attractive rates for the transportation of automobiles, as an experiment. These rates are applicable between northern points and the resort cities of the Mississippi Gulf Coast and Florida. It is too early at this time to determine the results of this experiment, but, in view of the success of similar experiments in the Far West, it would seem worthy of a trial, under somewhat similar conditions, in other parts of the country.

Coach Travel

The improvements in what might be called sleeping-car travel are having their effect. Such travel shows an increase in 1929, the decline in the total passenger traffic being attributable entirely to the continuing loss

of former day-coach passengers to other means of travel. All of the roads have been studying this class of travel, and some of them have been making progress in regaining it, by one means or another.

The practice of running fast, comfortable trains, consisting exclusively of day-coach equipment, showed a material development during the year. The trains of this character now in operation include the following:

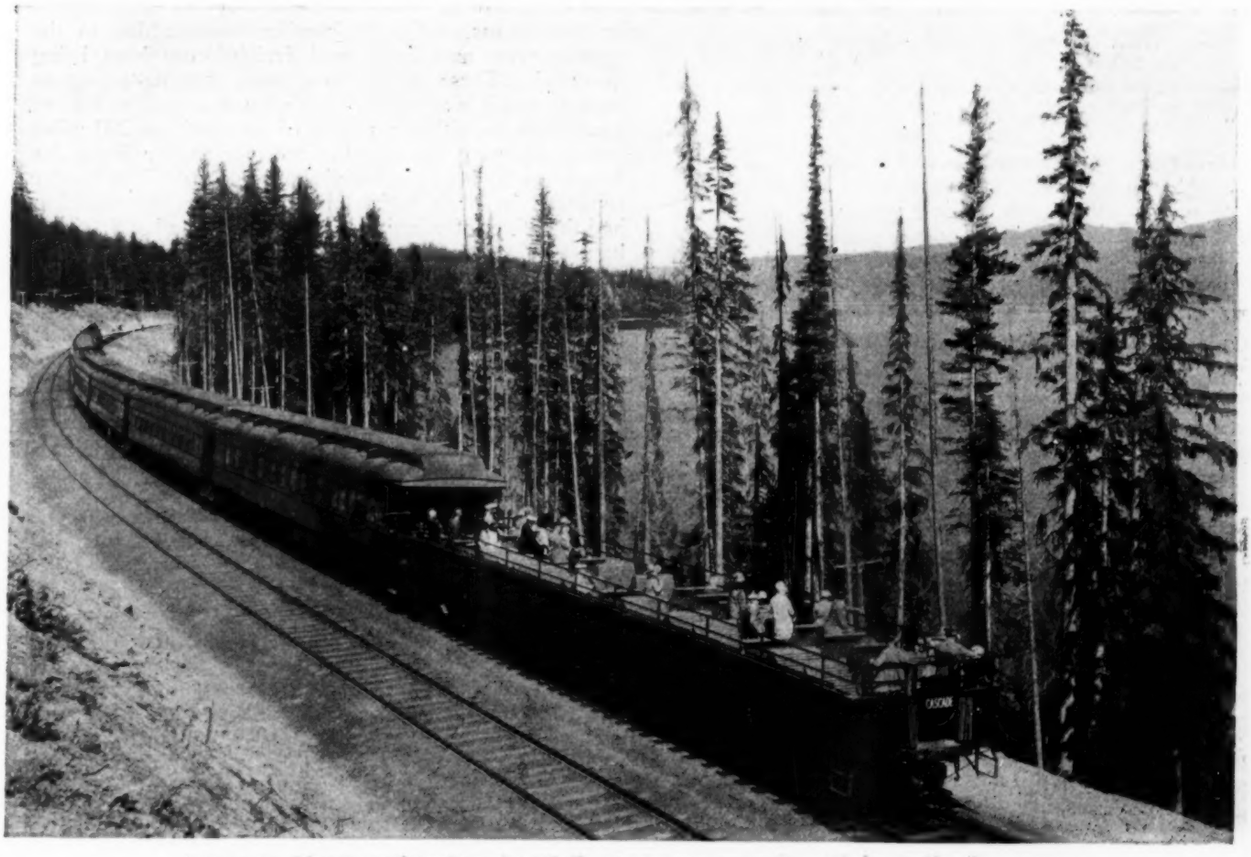
Train	Railway	Between	And
Daylight	S. P.	San Francisco	Los Angeles
Day Coach De Luxe	N. Y. C.	New York	Buffalo
Niagara Falls De Luxe	M. C.	Chicago	Niagara Falls
Motor Queen	Big Four-M. C.	Cincinnati	Detroit
Blue Comet	C. R. R. of N. J.	New York	Atlantic City

The operation of these fast and comfortable trains is receiving a great deal of study by passenger men all over the country, and indications are that several more of them will be put in service during 1930. The last three trains listed were established this year. All of them make unusually fast time, and all are equipped with cars especially designed for coach train service. Their make-up includes observation and chair cars, for which there is no extra charge. Included among the developments along somewhat similiar lines is the action of the Reading in taking off all parlor cars on its hourly trains between Philadelphia and Atlantic City and using lounge cars instead, with a nominal charge of 35 cents a seat.

The Chicago Great Western has also established a precedent with its new "Blue Bird", operated between the Twin Cities and Rochester, Minn. This is a three-car train, consisting entirely of gas-electric rail motor cars, and is equipped with a combined parlor-observation car, a club car and a coach. The observation car has a solarium and is equipped with the first Pullman sections ever to be installed on a rail motor car.

A number of fare reductions were made during the year in an effort to attract coach travel. So-called "second-class" rates were established from the Middle West to California. For the period of February 1 to March 2 eastbound, and March 15 to April 30 westbound, and again from August 15 to September 15, a rate of $52.50 one way, instead of the regular rate of $79.84, was made effective between Chicago and the Pacific Coast, the tickets being honored in day-coaches only. The rates from and to other points in the Middle West were reduced in proportion. These low rates were well advertised and a great many tickets were sold, but there is a considerable difference of opinion as to the merits of the plan. On one railroad, ticket agents were instructed in advance as to what information would be required of them, such as whether the passenger would have used the railway anyway, or whether the low rate attracted him away from other means of transportation. The results were indefinite. There was no unanimity of opinion among the ticket agents, about half of them maintaining that the reduced fares attracted business, the other half being equally convinced that they did not. However, even though the results may be said to have been inconclusive, it is probable that these rates will be given another trial in 1930, in a further effort to prove or disprove their worth.

In sporadic instances throughout the country, certain railways established extremely low rates for coach travel between certain points. In most cases these too produced inconclusive results, although the $15 fare established in 1927 between Portland and San Francisco on the Southern Pacific, as compared with the regular fare of $26.96, continued to produce excellent results, steady increases being shown in the number of passengers handled, and in the revenue from ticket sales between those two points.



Mountain Observation Cars Are an Added Attraction on Many of the Trains in the West

One general passenger agent who had reductions made in the price of tickets between several points on his line, and continued the experiment for four months, writes as follows:

"We put in one-way coach fares for the purpose of ascertaining the value of the theory that such reduced fares would be successful in stimulating our passenger traffic sufficiently to bring in more revenue than would be received under the standard one-way fares.

"A careful check of the results indicates that we sold more tickets, but had quite a heavy decrease in revenue. It is our conclusion that the experiment was not successful, and, when the tariff, under which the tickets were sold, expired on November 30, we returned to our normal fares."

The Chicago & Alton made a successful experiment in attracting coach travel. Low rates were made to school children from various points along the C. & A. in Illinois to Chicago, and special sight-seeing tours of that city were arranged Frequently as many as 600 to 700 children were handled in special trains in one day, and, in all, more than ten thousand passengers made use of this service.

Air-Rail Service

While there was some activity along the lines of developing air-rail service in 1928, it may be fairly said that 1929 marked the real beginning of this joint form of transportation. The services in operation are as follows:

Railways	Aviation Companies	Between	And
Penna., Santa Fe.	Transcontinental Air Transport	New York	Los Angeles
N.Y.C., Santa Fe.	Universal Aviation Corporation	New York	Los Angeles
Southern	Southern Air Transport	New York	New Orleans
Illinois Central..	Southwest Air Fast Express	Chicago	Texas points
Florida East Coast	Pan-American Airways	Jacksonville	West Indies
Texas & Pacific..	Standard Air Lines	St. Louis	Los Angeles
Chicago Great Western	Universal Air Lines	Several cities along the C. G. W.	St. Louis and Cleveland
Missouri Pacific..	Mexican Company	St. Louis	Mexico City
Chicago & North Western	Rapid Air Lines	Chicago	South Dakota and Wyoming points
Santa Fe..... C. & A. ..... Burlington .... Milwaukee .... Rock Island....	Western Air Express	Chicago	Los Angeles
St. Louis-San Francisco	Western Air Express	Florida points	Los Angeles

The list of such services inaugurated this year, as shown in the table, is an imposing one and gives an accurate indication of the trend in this direction.

Freight Service

Improvements in freight service continued rapidly, to the increasing and oft-expressed satisfaction of shippers and receivers. The on-time records for freight trains are fast approaching those of passenger trains. Practically all the roads schedule most of their freight trains, not merely the fast perishable and manifest runs, but also what was formerly classified as "drag" freight. Except as a term to differentiate between freight that moves rapidly and freight that moves extremely rapidly, the words "drag freight" have practically lost their meaning on most railways.

An outstanding development was the reduction of nearly 16 hours in perishable schedules from the Pacific Coast to eastern seaboard points, with correspondingly improved schedules to intermediate points. This is the culmination of the vastly improved operating methods employed in transporting perishables.

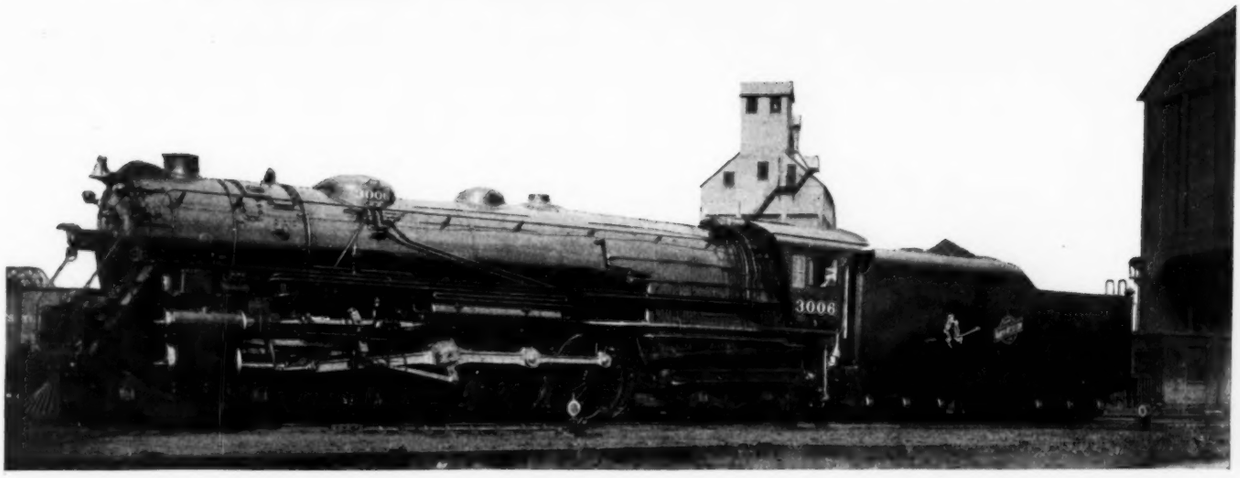
The facilities for handling perishable freight have been greatly improved, particularly as to terminal facilities in various cities. Many such perishable terminals were opened this year, and, in more than one instance, have attracted traffic away from old, established routes.

The service given less than carload freight continues excellent. Surveys of thousands of package cars by the chambers of commerce of various cities show that such package cars averaged about 94 per cent on time in 1929, as compared with the average of about 89 per cent in 1928. With the regularity of service afforded, package-car service is being greatly extended.

Many railways now operate night way freights and save from 8 to 12 hours in the delivery of merchandise by this means, a freight handler being added to the regular crew and lights and freighthouse keys being provided. These trains leave their starting points as soon as possible after the freighthouse closes, and serve local stations within a radius of as much as 200 miles before morning, so that the receiver may call for his freight as soon as the freighthouse opens. The service rendered by such night locals on many railroads has had the effect of winning back much of the l. c. l., short-haul traffic formerly diverted to the motor trucks.

* * * *

The D. L. & W.'s "Lackawanna Limited" Westbound at Denville, N. J.



Chicago & North Western 4-8-4 Passenger Locomotive, Built by Baldwin *

The Year's Trend in Equipment Development

Roller bearings to be applied to locomotive axles— Interest in high boiler pressures growing

By C. B. Peck
Mechanical Department Editor, *Railway Age*

THE most striking innovation of the year 1929 in locomotive design is the decision to make an application of roller bearings to the journals of locomotive axles. An order for a locomotive was placed with the American Locomotive Company by the Timken Roller Bearing Company in July, in the construction of which such an application of Timken bearings is to be incorporated.

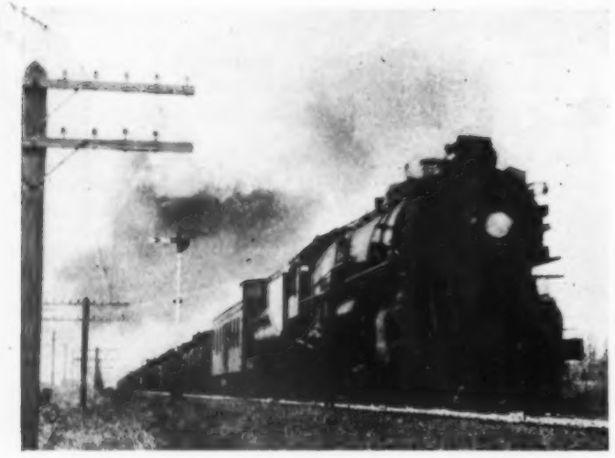
For some years past the outstanding developments which have been commented on in these articles have had to do more with the proportioning of the locomotives with relation to boiler capacity and power output than with details of mechanical design. It is true that during these same years certain modifications of the structure of the locomotive have been taking place, notably in the application of cast-steel bed plates, in many of which the cylinders have been cast integral, but the serious consideration of the application of roller bearings to locomotive journals is the first attempt which has been made to improve the machine efficiency of the modern locomotive. This undertaking is one which requires no small amount of courage, and it will, of course, be many months before the outcome will be known.

With the materials which the metallurgist has now made available, it is scarcely possible to conceive of a desirable improvement which cannot be made to operate successfully. The important problem becomes more one of developing it to sell at a price which will be commercially practicable. And if at the outset the cost is prohibitive, conditions now change so rapidly and the application to engineering problems is so intensive that a few years, or even a few months, may see it brought within the range of commercial possibilities. Even though it is too early to speak with confidence of the outcome of this initial step toward improving the machine efficiency of the locomotive, that step once having been taken, it is not too much to look forward with considerable confidence to an ultimate solution of the problems involved.

High Steam Pressures

The use of higher steam pressures in America has been the subject of comment in these articles before. There has been no abatement of interest in this subject, and that the belief in the possibilities of high pressures is becoming stronger is evident from the fact that orders for two locomotives of the so-called Schmidt double-pressure type were placed last year, one for the Canadian Pacific and one for the New York Central. These locomotives will have double-pressure boilers, the high-pressure portion of which will generate steam at about 800 lb. working pressure by indirect evaporation, and the low-pressure section will generate steam at about 200 lb. pressure, which will be used to supplement the exhaust steam from the high-pressure cylinder in supplying the low-pressure cylinders.

* This locomotive develops 76,500 lb. tractive force, including the booster. The boiler pressure is 250 lb., the driving wheels are 76 in. in diameter, and the cylinders 27 in. by 32 in.



A.R.A. Brake-Test Train in Operation on the Southern Pacific

Another high-pressure locomotive is being laid out for the Delaware & Hudson. This locomotive, which in general arrangement and working principle will follow the ideas of John E. Muhlfeld already incorporated in two locomotives now in service on the Delaware & Hudson, will operate at a pressure of 500 lb. It will be remembered that the first of these locomotives built for the Delaware & Hudson operates at a pressure of 350 lb. and the second at 400 lb., the locomotive now under consideration, therefore, involving a distinct step forward in boiler pressure. The cylinders of all three locomotives are of the cross-compound arrangement.

Similarity of Passenger and Freight Locomotives

There has been distinct evidence during the past year of the increasing favor with which the four-wheel trailing truck is regarded. This is particularly evident in the relatively large number of locomotives of the 4-8-4 type for which orders have been placed during the past year, both for passenger and freight service.

Prior to fifty years ago a single type of locomotive—the American, or 4-4-0 type—was quite generally employed in both freight and passenger service. During most of the past fifty years locomotives for the two types of road service have grown farther and farther apart, both in size and proportions. The use of the 4-8-4 type in both classes of service strikingly illustrates the present trend toward a closer relationship in the proportions required to meet the demands of the two services. With increasing freight-train speeds the trend is toward larger driving wheels on the locomotives designed specifically for freight service and the need for high boiler capacity and horsepower output in these locomotives is similar to that required for passenger service. With the growing demand for the operation of longer and heavier through passenger trains the tractive capacity required of the passenger locomotive is approaching nearer to that of the freight locomotive.

Special Steels in Boiler Construction

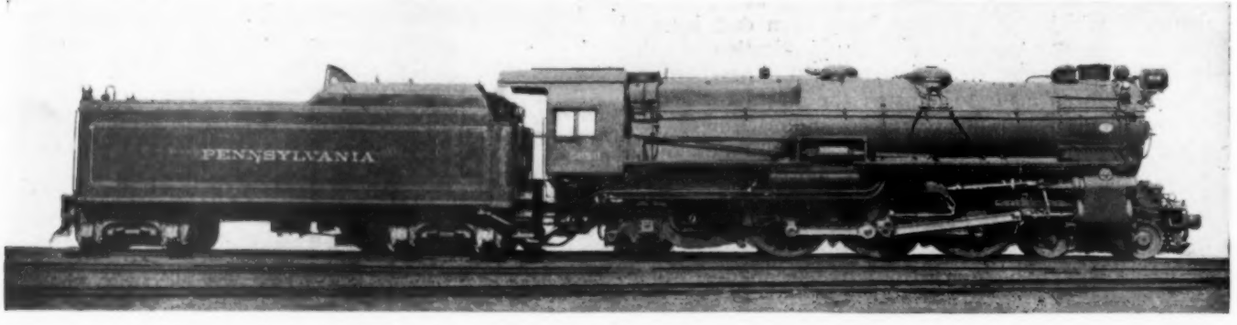
Continuing interest is being shown in the use of special steels in the construction of locomotive boilers for pressures of 250 lb. or more. Nickel steel, first employed by the Canadian Pacific, has now been used in the construction of a few locomotive boilers for other railroads, and the Canadian National has continued the use of the so-called high silicon steel which was first used in an order of 4-8-4 type locomotives built for that railroad in 1927. One of the locomotives in which nickel steel was used for the boiler shell is the Pennsylvania K5 locomotive completed early last year. This locomotive, which carries a boiler pressure of 250 lb., has 27-in. by 30-in. cylinders and develops a tractive force of 54,675 lb., with the maximum cut-off limited to 67 per cent. The well-known K4 class of Pacific locomotives of this road develop a tractive force of 44,460 lb., with a boiler pressure of 205 lb. and 27-in. by 28-in. cylinders, operating at nominal full-stroke cut-off.

This locomotive also illustrates the tendency toward longer piston strokes for passenger locomotives. A more striking example of this trend is found in the new Chicago & North Western 4-8-4 type passenger locomotive which has a piston stroke of 32 in.

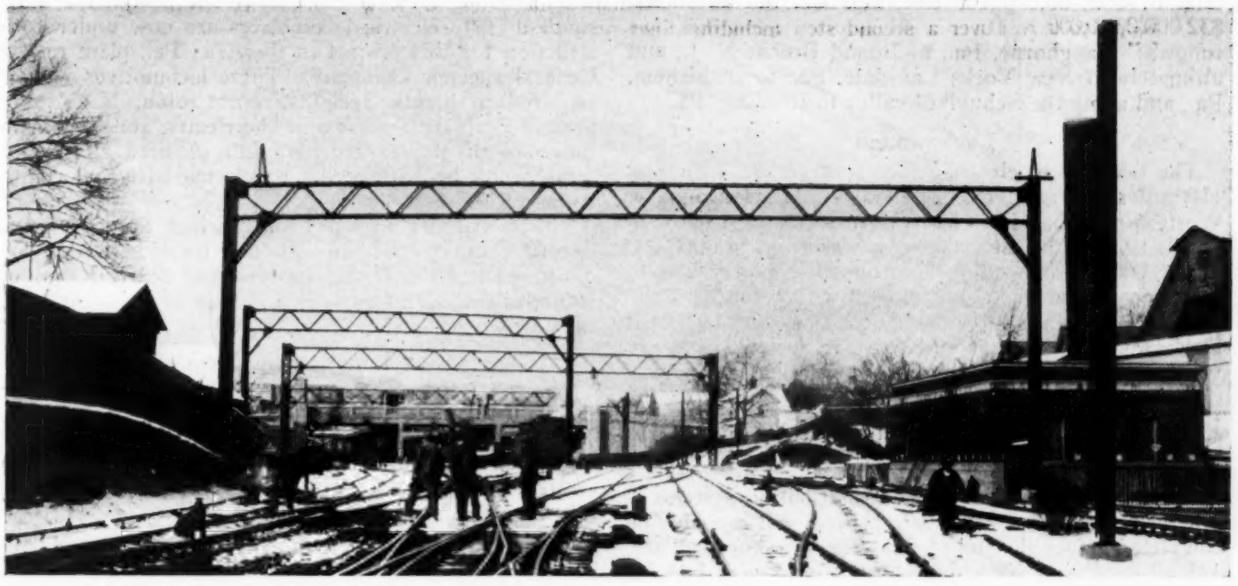
Diesel Locomotives

The outstanding Diesel-electric locomotive now in service in America is the No. 9000 of the Canadian National which was referred to in these columns last year. Of interest at this time is the fact that the two engines of this locomotive have demonstrated their ability to develop in service their full rated capacity of 2,660 hp. A notable feature of this locomotive is the high speed at which the oil engines operate—800 r.p.m.—and a correspondingly light weight. A Diesel-electric locomotive has been built during the year by the Baldwin Locomotive Works. It is equipped with a 1,000-hp. Krupp Diesel engine which operates at a maximum speed of 500 r.p.m. A locomotive built by the American Locomotive Company was delivered to the New York Central in 1928 which is equipped with a 900-hp. V-type Diesel engine built by McIntosh & Seymour, with a crank shaft speed of 310 r.p.m. This is the first application of the air-injection method of

(*Continued on page 45*)



Pennsylvania K5 Locomotive with Nickel-Steel Boiler Shell—Tractive Force 54,675 lb. with 250 lb. Boiler Pressure—Cylinders 27 in. by 30 in.—Driving Wheels 80 in.



Lackawanna Tracks at Montclair, N. J., Showing Construction Work in Progress

Status of Electrification Programs

Work in progress now greater than at any other time in the history of electric traction

By Alfred G. Oehler
Electrical Department Editor, *Railway Age*

ELECTRIFICATION in the eastern part of the country will constitute one of the large items in the railroads billion-dollar improvement program for 1930. The five principal undertakings now in progress are those of the Pennsylvania, the Reading, the Lackawanna, the Cleveland Union Terminal and freight lines of the New York Central in New York City.

Pennsylvania

The original Pennsylvania program as announced October 31, 1928, involved an expenditure of $100,000,000 and included passenger and freight service on 325 miles of line and 1300 miles of track, beginning at Hell Gate Bridge, New York, where connection is made with New England, and extending west and south to Wilmington, Del.; also west from Philadelphia, Pa., on the main line in the direction of Harrisburg as far as Atglen, Pa. It included also the low grade freight lines which join at Columbia, Pa., and connect the cities of New York, Philadelphia and Wilmington with the west. This work is scheduled for completion in six to seven years.

Electric trains should be in service between Philadelphia and Trenton, N. J., by July this year.

In October, 1929, negotiations were concluded by the Pennsylvania Railroad and the City of Baltimore which open the way for complete electrification of the railroad from New York, N. Y., to Washington, D. C. The new agreement which has been in negotiation for several years covers extensive station platform and track improvements in and through Baltimore and the construction of two new double-track tunnels within the city limits. This project represents an expenditure in addition to that for the original $100,000,000 program. Between five and six years have been allowed for its completion and it is estimated that electrification from New York to Wilmington will then have been completed.

Fifty-nine multiple-unit cars have been ordered These are to be equipped by the Westinghouse Electric & Manufacturing Company and all but four are similar to those already in use. When these are delivered, the Pennsylvania will have a total of 345 motor cars operating under its 11,000-volt trolley.

Two new single-phase passenger locomotives are also to be built by the General Electric Company to railroad specifications. These will have 2-B-2 running gear with flexible link drive for each driving axle.

Reading

Announcement of the Reading electrification to include 49.9 route miles and 110 miles of track in the Philadelphia, Pa., suburban territory, at an expenditure of $20,000,000, was made on December 14, 1927. The work now in progress is going forward on schedule time, first attention being given to the line from the Reading terminal in Philadelphia to Lansdale, Pa. New car shops are under construction and will be finished by February 15, 1930, and all of the original program should be completed by July, 1931.

On December 7, 1929, Agnew T. Dice, president of the company, stated that the Reading would invest a

total of $52,000,000 for electrification, the additional $32,000,000 to cover a second step including lines as follows: Langhorne, Pa., to Bound Brook, N. J., and ultimately to New York; Lansdale, Pa., to Bethlehem, Pa., and along the Schuylkill valley to Reading, Pa.

Lackawanna

The decision to electrify 66.8 route miles, including 110 miles of track, of the Delaware, Lackawanna & Western suburban lines in New Jersey, was reached in April, 1928. The estimated cost was from $14,000,000 to $18,000,000 depending upon whether power was to be purchased or generated in a plant to be built by the railroad. In May, 1929, the railroad announced that it had abandoned its contemplated plan to build a power plant, and that contracts for the purchase of power covering a period of 20 years had been made with the Public Service Electric & Gas Company, the Jersey Central Power & Light Company and the New Jersey Power & Light Company.

Work on the substations and distribution systems is now in progress and the entire project will probably be completed before the end of this year. In August, 1929, 141 all-steel vestibuled multiple unit cars were ordered from the Pullman Car & Manufacturing Corporation and General Electric Company.

The Lackawanna project includes a number of innovations, notable among which are that it will be the first application of 3000-volt, direct-current multiple-unit cars and all power will be converted in substations equipped with mercury-arc rectifiers. The rectifiers are to be compounded to compensate for voltage drop on the trolley. Two, three-power, oil-electric-battery locomotives have been ordered for service between Hoboken, N. J., and Secaucus.

New York Central

Plans adopted by the New York Central provide for the complete elimination of steam power on its west-side lines in New York City from Spuyten Duyvil south. Forty electric locomotives are now under construction for this project in the Erie, Pa., plant of the General Electric Company. These locomotives will be required to handle freight from Croton, N. Y., the present northern terminus of the electric zone, south to the Sixtieth street yards. South of here all freight service will be handled by oil-electric-battery locomotives.

An electrification project under which the New York Central plans electrical operation of trains between New York and Buffalo, N. Y., a distance of nearly 500 miles is under consideration. Should this be consummated, the cost would be about $75,000,000.

Cleveland Union Terminal

Work on the electrification of the Cleveland Union Terminal lines is proceeding rapidly and eighteen of the twenty-two, 204-ton locomotives have been delivered by the General Electric Company. It is expected that electric operation of the terminal will be started early this year.

Great Northern

Electric operation on the 73-mile section of the Great Northern between Skykomish, Wash., and Wenatchee, Wash., including the new 8.9-mile Cascade tunnel, was inaugurated on January 12, 1929. Four additional motor-generator type locomotives are now being built by the General Electric Company.

Illinois Central

Since the completion of the electrification of the suburban service of the Illinois Central on July 21, 1926, the railroad has proceeded to electrify its freight service north of Thirty-first street. Four 100-ton, 1800-hp., electric locomotives were ordered in March, 1929, for this purpose from the Westinghouse Electric & Manufacturing Company. Six 100-ton, 600-hp. G.E. oil-electric locomotives will be used for switching.

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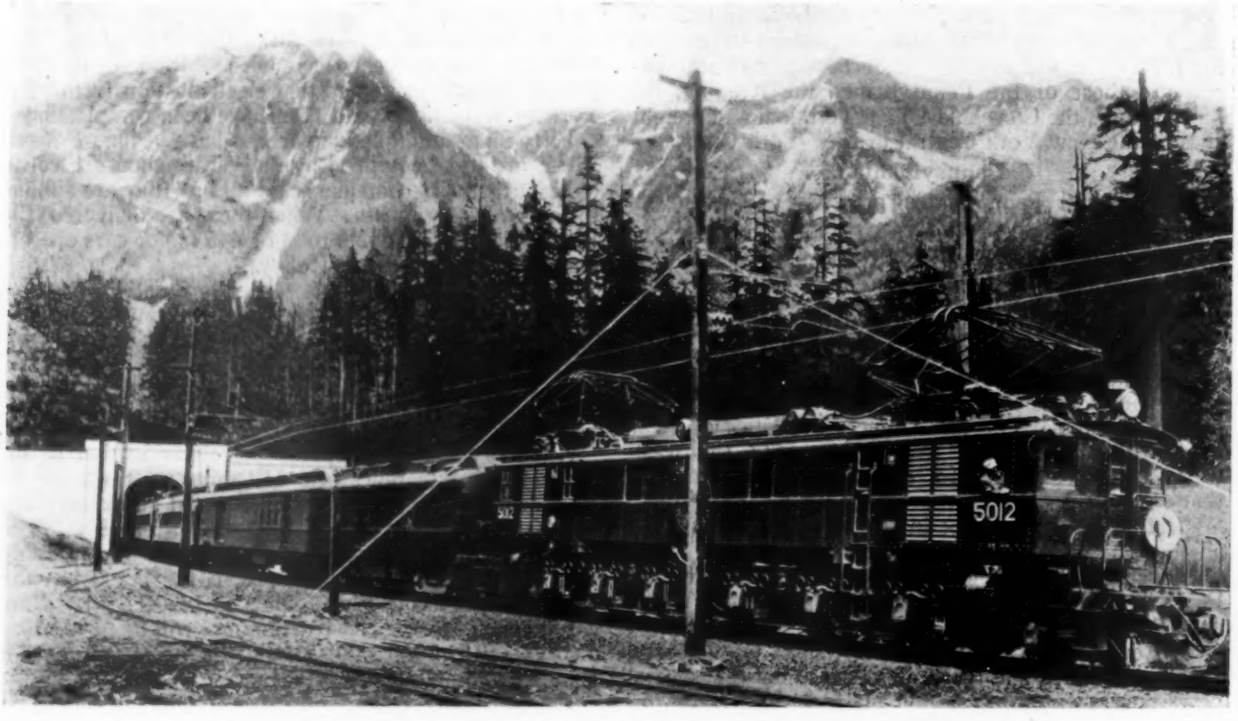
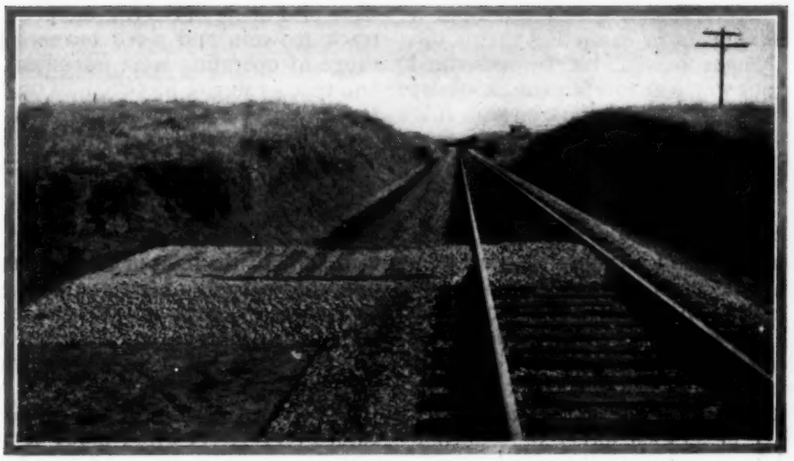


Great Northern Train at the West Portal of the Cascade Tunnel, Washington



The Fixed Properties of the Railways Are Now in Better Condition Than at Any Previous Time in Their History. — On the Atchison, Topeka & Santa Fe in Oklahoma

Marked Progress in Maintenance

Close of 1929 ends a five-year period of remarkable performance and increasing standards of upkeep

By Walter S. Lacher
Western Engineering Editor, *Railway Age*

THE year 1929 was one of large expenditures for maintenance of way and structures. The expenditures for the first nine months of the year totaled $655,499,440, compared with $639,020,840 and $662,738,879 for the corresponding periods of 1928 and 1927. With the exception of the latter year (1927) the expenditures for maintenance of way were larger in this nine months' period than in the same period of any previous year (except in the abnormal year of 1920 when the total was $787,432,175). Measured in another way, the ratio of maintenance of way expenses to total operating expenses for the first nine months of 1929 was 19.4 per cent, compared with 19.1 per cent for the same periods of both 1927 and 1928. There is, therefore, good reason to anticipate that the maintenance of way ratio for the entire year of 1929 will exceed the figure of 18.9 per cent for 1928, which represents the result of a gradual increase from 16.6 per cent in 1923.

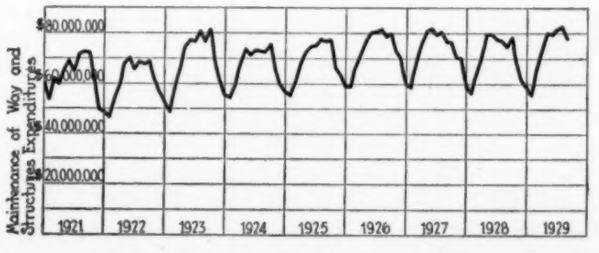
But the outstanding fact with respect to 1929, from the standpoint of maintenance of way activities, is that the year just closed completes five years of the most uniform and steadily increasing outlay for maintenance of way in the history of the railroads. This is apparent from the following table of annual expenditures for maintenance of way and structures.

1920	$1,030,504,000
1921	764,662,000
1922	736,181,000
1923	821,913,000
1924	802,673,000
1925	824,320,000
1926	877,877,000
1927	879,496,000
1928	845,612,000
1929	860,000,000 (estimated)

But the full weight of the evidence of the increasing importance attached to the necessity for adequate appropriations for the upkeep of tracks and structures is not apparent unless adequate consideration is given to the fact that the fixed properties of the railways are now in better physical condition than at any time in railway history. The expenditure in 1929 represents outlays for current maintenance. No part of it was incurred in making good deferred upkeep.

Little Decrease in Seasonal Fluctuation

There is another side to this picture. For some years, there has been a movement on foot to extend the major activities of the maintenance of way department over a large portion of the year. Some progress has been made in this direction. Whereas rail renewal was formerly considered essentially summer work, considerable rail is now being laid during the winter months, and the placing of orders for a million and one-half tons of rail before December 1 last, indicates that this practice is on the increase. But the chart of expenditures by months, and the diagram showing the range of maximum and minimum forces in the maintenance of way department, demonstrate clearly that the fluctuations between summer and winter activites have not decreased during the last seven or eight years.

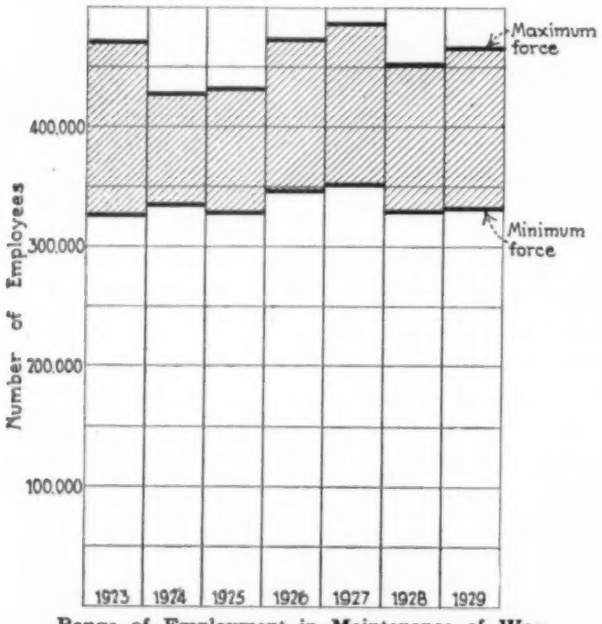


Expenditures of Class I Railways for Maintenance of Way and Structures, by Months

While the Delaware & Hudson, which has been a pioneer among northern roads in extending major operations through the winter season, has demonstrated that its practices are not inimical to economy, a recent canvass of the opinions of railway officers on this subject indicates that most of them are still not enthusiastic as to the possibilities of a more uniform employment of forces. Progress in that direction is slow.

Burden of Increasing Loads

The maintenance of way and structures department bears a heavy burden as a result of the program to increase efficiency of operation through the acquisition of heavy locomotives and cars. Much of the influence of the increase in the weight of equipment is reflected in the capital expenditures for heavier rail, additional ballast and other increments in the strength of the track structure. But heavier loads also affect the expenditures for upkeep and have given rise to much thought and discussion of means for decreasing the perpetual wear and tear to which track is subjected. Never before in the history of the railroads have their officers been more alert to investigate possibilities for improvement. Many railways have undertaken individual tests



Range of Employment in Maintenance of Way and Structures, Class I Railways

of various kinds, including one embodying a rather marked deviation from conventional construction, and the installation by one railway of a stretch of track constructed strictly to the standards of a competing property. In addition, the concrete roadbed on the Pere Marquette has been supplemented by a new section of some 400 track feet embodying certain modifications of the original installation which has now been in service for three years.

Power Tools Impose New Problems

From the standpoint of actual performance, there has been a continued application of equipment for the saving of labor, intensified by the introduction of several new devices and improvements in others. Among new developments are a machine for adzing ties, a power bolt tightener, two power rail grinders and a power track jack. Marked improvements and changes of design were also made in electric tampers, while ballast discers, track mowers and weed burners permitting a greater range of operation were introducd during the year. No one type of device has been accorded more active attention in the last 12 months than that installed on curves for the purpose of lubricating rails and wheel flanges. Two manufacturers introduced new designs of this type of equipment during the year.

In the case of track motor cars, new development during the year seems to have been centered on inspection cars, both of the light or one-man type, and the enclosed-body car capable of accommodating a party of considerable size. On the one extreme, effort has been concentrated on lightness and low center of gravity, leading to some rather marked deviations from previous models. The larger inspection cars, on the other hand, represent what is nearly the maximum limit in the size of track cars, every effort being made to provide comfort, excellence of vision and relatively high speed; in a word, a practical business car minus living quarters.

New Developments of the Year

Many items of labor-saving equipment having passed definitely beyond the experimental stage, railway maintenance officers are finding themselves confronted with the same problems that must be met by the plant supreintendent, namely, problems of plant management, plant production and plant maintenance. Of these, the problem of production or maximum utilization of each unit of equipment looms large and has given rise to the setting up of production schedules, which in the case of the scattered work of track maintenance implies the assignment of machines to various districts, divisions and subdivisions for specific periods, with suitable systems of records that will insure an adequate check on both performance and output. Another pertinent problem is that of the work-equipment operator, trained to secure maximum output and sufficiently versed in the intricacies of the machine to guard against errors that will result in unnecessary wear or damage to the machine.

These factors in the problem of employing labor-saving equipment have resulted in a gradual awakening to the fact that the centraiized control of mechanical equipment calls for special training, and one road after another is making provision for a work-equipment supervisor. While the problems of maintaining work equipment have been carefully studied, the manner of their solution follows no general rule. On some roads repairs are handled by the mechanical department; on others in independent maintenance of way shops. But regardless of the policy pursued in this regard, there is need for an adequate liaison between those who use the equipment and those who repair it, a principle which is now being more generally realized, with the result that an increasing number of railroads are arranging to send their machine operators to the repair shop during the off-season to assist in the repair work.

Better Methods in Bridge Work

In the field of bridges, no one development can be cited as having had its inception during 1929. However, there are three practices which gained wide use during the year and which were applied on some roads for the first time during the last 12 months. These are the framing of bridge timbers before treatment, the application of the water-cement ratio to concrete proportioning and the employment of autogenous welding in the strengthening or repair of steel bridges. The first two fall under the head of established practices and are,

in a sense, but incidental to the employment of more thoroughgoing and painstaking measures of all kinds to secure good workmanship. The last is still in the experimental stage, for while welding to the extent that it has been applied to bridges on railroads is accepted as thoroughly reliable, it is experimental in that a full realization of its applicability to bridge work will require a considerable period of trial.

Water supply has also profited from the growing appreciation of the favorable influence of adequate service facilities on the efficiency and reliability of railway transportation. If one activity of this department were to be singled out as characterizing the prevailing trend of the last year, it is that of replacing old plants, not so much because they were inadequate, but because they were inefficient. While this work is being carried out on most railroads in conformity with programs extending over a considerable period of years, a number of carriers were actively engaged during last year on projects of intensive retirement of old facilities.

Centralized Supervision

Increasing attention to water supply has had another effect, which, although by no means peculiar to 1929, was distinctly evident in that year. With the more intensive study of water-supply problems has come a more general realization of a fact long recognized on a few roads, namely, that water supply demands the undivided attention of specially trained men through the agency of a separate subdepartment.

In the special field of water treatment, the current trend is that of a broader attitude on the part of the two primary schools of thought. The champions of roadside treatment, on the one hand, are recognizing the special field for internal treatment, while several manufacturers of boiler compounds, on the other hand, are now offering roadside treatment as a regular department of waters of relatively low hardness, waters which in earlier years were deemed reasonably satisfactory without treatment. The use of coagulants as an adjunct to clarification in the process of water softening is also definitely on the increase.

Equipment Development

(*Continued from page 40*)

supplying fuel to the cylinders on a locomotive in America.

Passenger Cars

For several years the outstanding development in passenger equipment has been the increasing attention paid to architectural treatment and ornamentation of the interiors of passenger cars and to the appointments affecting the comfort of passengers. During the past year a number of railroads have extended this attention from the individual coaches to entire trains, and several trains with de luxe appointments for coach passengers have been inaugurated.

One exception to this notable trend toward increasing the comfort and pleasure of coach travel is the equipment of suburban coaches with seats for three persons on one side of the aisle and two persons on the other. The frequent reference to these seats by those who ride in them as the two-and-one-half and one-and-one-half seating arrangement indicates the lack of popularity with which they have been received.

Freight Cars

No marked innovations in freight-car design or equipment have been brought out during the past year. The outstanding developments pertaining to freight cars are the completion of the laboratory tests of draft gears undertaken by the Mechanical Division of the American Railway Association in a test plant at Purdue University. From this study, based on the detailed reports of the laboratory tests of 100 draft gears of ten different types, a tentative specification has been developed for freight-car draft gears which sets forth requirements for capacity, reaction, recoil, sturdiness, endurance, sticking and uniformity of action. These tests and the tentative specifications which have been based on their results have tended to clarify the draft-gear situation and will assist in giving more effective direction to future developments in draft-gear design.

They still leave the question of adequate draft-gear maintenance to be solved, however. The first step in the solution of any problem is an understanding that the problem exists. Such an understanding in this case is fast becoming general and may be considered as satisfactory evidence of progress toward the ultimate establishment of conditions which will make it possible for draft gears to perform their function of car protection throughout the life of the cars.

The past year has seen the completion of the first part of the freight car air-brake test program of the Mechanical Division, American Railway Association and definite progress in the second part of the program. The rack tests conducted at Purdue University have been completed and the road tests are now under way on the Siskiyou line of the Southern Pacific in northern California and southern Oregon.

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Tracks and Sheds at Boulevard Station of the Wabash, St. Louis, Mo.

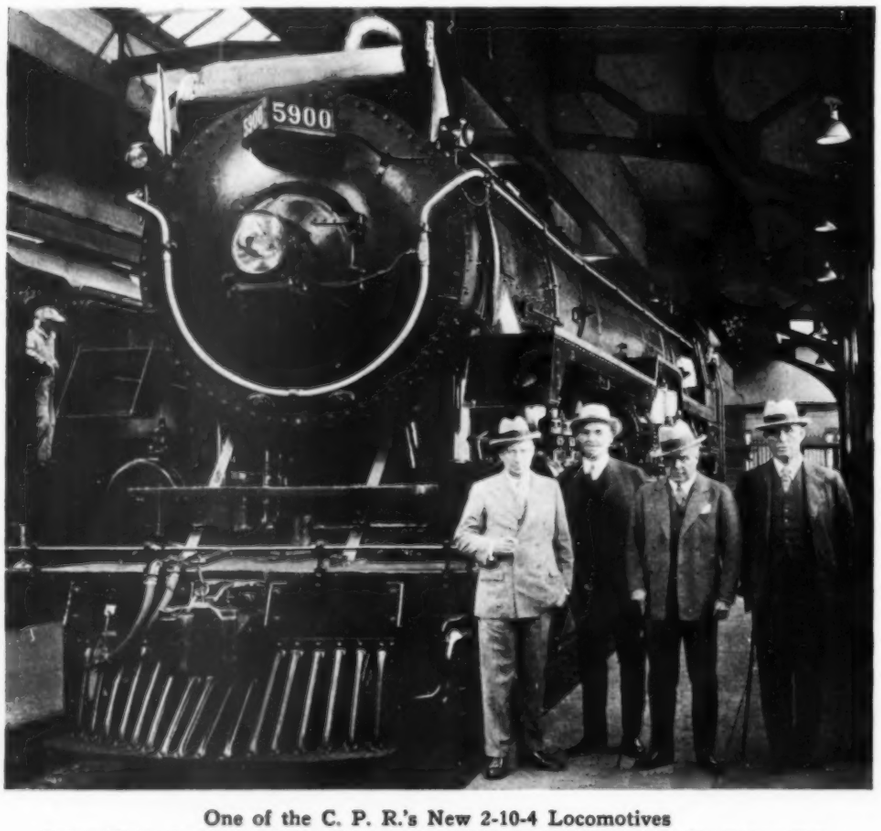
Great Progress in Canada in 1929

New lines increase—Great terminal planned for Montreal —Traffic, heavy in first half of year, now reduced

By James G. Lyne
Financial Editor, *Railway Age*

THE year 1929 started off auspiciously for the Canadian railways. The preceding year, 1928, which had been the best year in their history, due in large measure to the record-breaking grain crop, gave a great momentum to business during the first half of 1929—so great indeed that both traffic and earnings in the first half of 1929 exceed that of the same period in 1928. In the early part of September, however, when the grain crop began to move, there was an immediate recession from the comparable period of 1928. In the week ended August 31, car loadings in Canada were 3,882 more than in the same week in 1928; in the week ending September 7, they declined to 3,736 less than the comparable week in 1928. At the end of August the cumulative total of car loadings for eight months of the year showed a gain of 57,757 cars over the same period in 1928. So great has been the recession this fall, however, that with the week ended December 7 the cumulative total for the year had fallen 147,777 carloads behind that of the preceding year.

The falling off in traffic has not been due entirely to a smaller grain crop, because there has, in addition, been an abnormal withholding from shipment of a large volume of the grain which has been harvested. This holding back has been due to the action of the Western Wheat Pool which has been dissatisfied with the price situation and has been withholding shipments waiting for it to improve. The reduction in cars loaded for that part of the year ended December 7, as compared with the same period of 1928, is divided among the various classifications of commodities as follows: Grain, 208,792; live stock, 6,528; lumber, 2,116; pulpwood, 28,443; and other forest products, 1,270. Increases have been shown in some classifications as follows: Coal, 7,740; coke, 4,236; pulp and paper, 13,982; ore, 17,676; merchandise and l.c.l., 12,701; and miscellaneous, 43,037. Cars received from connections are 50,844 ahead of a year ago. These totals plainly show that Canada is not suffering from a general depression by any means and that, given favorable crop conditions in 1930, none of major portions is likely to develop. This opinion is strengthened by the fact that, although the grain crop was light this year, it graded higher than ever before, which will assure to farmers the highest prices and will offset to a large extent any decline in their purchasing power.



One of the C. P. R.'s New 2-10-4 Locomotives
Left to Right: Sir Charles Gordon, Vice-President Hall, President Beatty and Sir Herbert Holt

The recent traffic decline has, of course, had its effect on railway revenues, which prior thereto had been very satisfactory. The Canadian Pacific in the first ten months of the year had operating revenues of $178,091,528, a decline of $5,497,002 from the same period last year. Operating expenses showed a slight increase so that net operating revenues, $35,441,625, were $5,789,942 less than for the same period in 1928. On the Canadian National, operating revenues for the first ten months of 1929 totaled $220,687,731, a decrease of 2.55 per cent. Operating expenses were $180,536,026, a slight increase. Net operating revenues totaled $40,410,110, a decrease of 13.49 per cent as compared with 1928. The operating ratio in 1929 (ten months) was 81.81, as compared with 79.51 in the same period of the preceding year.

The railways are, how-

ever, looking forward to 1930 without pessimism. Said President Beatty of the Canadian Pacific in a recent interview: "We have no reason to expect that, taking 1930 as a whole and given good crops, the results of our operations in that year will not be satisfactory."

Many New Lines Built

Canada is witnessing a great deal of railway development, i.e., the extension of lines into territory not heretofore served by rail transportation. The best known of the new lines is that of the Hudson Bay Railway, constructed by the Canadian government for operation by the Canadian National (see *Railway Age* of November 16, page 1142). This line is now virtually completed and will be put into regular operation in 1930. Whether it will provide a new route over which grain to Europe will move, which was the original purpose of its construction, may be doubted, but there is no question that it will offer the opportunity for an interesting experiment in developing the resources of a sub-Arctic region. The territory traversed by the line is rich in minerals. If these should be exploited extensively, and if other products—possibly those of fisheries or a meat industry—grow up to provide a remunerative traffic for the line, the result might well be further railroad development into a region generally looked upon as unproductive.

Both the large Canadian railways have extensive branch line construction programs, principally in the North and West of the Dominion. The Canadian National, in an official statement issued in Winnipeg in December, reported that "1929 can be regarded as one of the busiest and most important years" in its history. "Particularly is this true," the statement continues, "of the Western region, which embraces all lines west of Port Arthur and Armstrong. In that area there has been carried out a program of construction and betterment which has no rival closer than that period before the war when the Canadian Northern, Grand Trunk Pacific and Transcontinental railways were in

C. N. R. Station at Edmonton, Alta.

the making. . . . First there was the completion of the three-year branch line program authorized by the government in 1927. This involved 424 miles of new line in Western Canada."

At the 1929 session of Parliament a further three-year program involving 590 miles of line in Western Canada for the C. N. R. was authorized. Work is now in progress on virtually all this new mileage. The Canadian Pacific has a branch line program of equal or even greater proportions in the North and West.

Canada, it is scarcely necessary to point out, has large areas far removed from rail transportation. In recent years tremendous progress has been made in the exploration of many of these areas, using the airplane instead of the slower methods, afoot or in a canoe. The airplane, because of its great speed and the fact that it does not require a specially constructed right-of-way, is really a cheaper method of transportation than the more primitive forms. The consequence is that exploration and the location of valuable mineral deposits has been accelerated by many years. Where population is, or wants to be, a demand for railway transporta-

A Modern Hotel Where Three Years Ago Was Wooded Wilderness—Noranda, Que.

tion arises—since the lakes and rivers and the airplane cannot bring in all the conveniences that the railway can. The railway is recognized as essential for a well-rounded economic development. The next few years, therefore, promise to bring a great deal of railway development in Canada and much of this progress will have been occasioned by what some might call a rival method of transport—the airplane.

In addition to the construction of new lines, the Canadian Pacific completed its $15,000,000 hotel, the Royal York, at Toronto during the year. Several smaller hotels at other points were also completed. Among important construction work on the Canadian National, in addition to new lines, were the new shop and engine house facilities provided at Point St. Charles (Montreal), the construction of several hotels, a heavy program of bridge improvements, additional engine-house and yard facilities and passenger terminal improvements. The Canadian National has a project for a large modern passenger terminal at Montreal which will include air rights development, electrification, and the unification of its passenger terminal facilities in that city. Both the large railways in 1929 materially extended the installation of automatic signals.

Orders for freight cars placed by the Canadian railways in 1929 totaled almost 10,000, exceeding the total of any of the past nine years. Passenger car orders were likewise substantial. The Canadian National during the year ordered 50 steam locomotives and the Canadian Pacific 21. Of the former 18 were of the 2-10-2 type and 10 of the 2-10-4. The Canadian Pacific purchased twenty 4-6-4's.

Motor Competition Not as Serious as in U. S.

The Canadian railways have not felt the effect of motor competition to the same extent as have the railways south of the international border. Short-haul traffic, it is true, is declining, but not at such a rate that long-haul business is not able to offset, to a large extent, its losses. The principal reason for this situa-

tion lies in the fact that improved roads are not as plentiful in all parts of Canada as they are south of the boundary. In newly developed regions it is the really essential form of transportation which provides complete all-weather contact with the outside world—the railroad—which comes first, and the first highways that are developed probably serve the railways more as feeders than harm them as competitors. Another condition favoring the railway is the comparatively greater distance between large centers of population, as compared with such distances in the United States. Then the relatively heavier winters discourage the year-round use of motor vehicles in some parts of Canada to an extent comparable with their utilization in some parts of the United States. The Canadian railways have made great improvements in their passenger train service. The railway-owned hotels are many and provide excellent accommodations. Service of this character, combined with the great attractions of Canada for tourists, has enabled the Canadian railways to secure a great amount of patronage.

Immigration into Canada is encouraged by both the principal railways acting in close harmony with the Dominion government, and brings thousands of carefully-selected European settlers to Canada each year. The spread of agriculture is not restricted to the prairie lands of the West, but each year also finds more land brought under cultivation in Ontario and Quebec in the east, as timber lands are cut over and drained.

Mention has been made of railway development in western Canada. There has also been considerable—and that important—in the East. The Temiskaming & Northern Ontario, a north-south line owned by the Ontario provincial government is extending its line steadily northward and should before long reach James Bay, the southern extremity of Hudson Bay. The area in Northern Ontario and Northwestern Quebec is rich in minerals—the exploitation of which has resulted in the past few years in the springing up of many rather populous communities where but a few years ago there was nothing but swamp and forest. A typical community of this kind, made possible by the railroad, and now providing all the conveniences of normal living anywhere on the continent is Noranda-Rouyn in Northern Quebec, a mining area served by two new railway lines, a branch of the Canadian National and another of the Temiskaming & Northern Ontario.

Conditions Improve in Maritime Provinces

The Peace river district, one of the richest agricultural regions of the Dominion, and as yet comparatively undeveloped, lies northwest of Edmonton, Alta., some four hundred miles. There has been a considerable demand that better railway facilities be provided this region and the subject has been closely studied. During the past year the railway serving this territory, the Edmonton, Dunvegan & British Columbia, was taken over jointly by the Canadian National and the Canadian Pacific, being purchased from the Province of Alberta. Further railway development is proceeding in that region and the joint control of the line promises equal participation by them in the project.

One section of Canada which has thus far been entirely exempt from any effect of the low grain yield is the Maritime provinces. These provinces have not been in recent years so very prosperous and a few years ago a reduction of 20 per cent in their freight rates was made by benefit of a government subsidy in order to promote greater economic activity. Business is now on the increase in this section, traffic in August having been the highest of any month for the past nine years. The Dominion Atlantic, a Canadian Pacific subsidiary, in the first nine months of 1929 had an increase of 8½ per cent in traffic over the same period last year.

The Canadian Pacific's earnings in 1929 will, according to the statement of President Beatty, be sufficient to cover easily all charges and the 10 per cent common dividends, leaving a reasonable surplus. "Special income", i.e., income derived from hotels, steamships, telegraphs and other ancillary services, is expected to be somewhat higher than in 1928. The company in 1929 offered issues of $30,000,000 of stock, an equal amount of bonds and the same total of equipment trusts.

The outstanding event in Canadian National financing during the year was the beginning of negotiations looking toward the revision of the company's capital structure. This company, as has frequently been pointed out in these pages, has been operated for many years with the capital structure of an insolvent corporation. Capital issues, advances, and interest thereon are carried as liabilities, whereas a private corporation would years ago have had to undergo a reorganization, revising the capital liabilities to a total somewhere commensurate with the potential earning power of the company. A plan involving such a change has been under course of development for several years and, it is thought likely, may be ready for presentation to Parliament during its 1930 session. During the year the company reorganized its United States subsidiaries, the Central Vermont and the Grand Trunk Western,

Temiskaming Line's Station at Noranda, Que.

ending the receivership of the former and consolidating the properties and the financial structure of the latter. The Canadian National in 1929 issued $90,000,000 of bonds for refunding and capital purposes.

Canadian Systems Are Also U. S. Lines

The international character of the two great Canadian systems has been clearly recognized by the Interstate Commerce Commission in the formulation of its consolidation plan, by its assignment of their United States properties to the parent Canadian companies rather than to other United States systems.

The Canadian railways may, therefore, look forward with a great deal of confidence to the future. It is linked securely with that of the Dominion—a nation concerning the future of which it is impossible to be otherwise than optimistic. Moreover, Canada has far larger areas not served by railways than has the United States and, as the country's population increases and these areas are settled, a constant increase each year in railway mileage may be looked for for many years to come. The total mileage of new line constructed in Canada in 1929 totaled 841; in the United States, 666.

National Railways' Station at San Luis Potosi

Mexican Lines Improve Efficiency

National Railways reduce operating ratio despite military disturbance—Economize on fuel

By J. J. Franco
General Superintendent of Transportation, National Railways of Mexico

IT IS not so long ago that Mexico enthusiastically celebrated the fiftieth anniversary of its first steam railroad which extended from Mexico City to the Port of Vera Cruz, which line is now known as the Mexican Railway.

It was during President Porfirio Diaz' thirty-years' regime that the history of Mexico registered its greatest development in railroad building, and during the third portion of the past century we saw the building of the majority of the roads now crossing the country in all directions. These lines join the border of the United States on the north with that of Guatemala on the south, and the Gulf of Mexico with the Pacific Ocean, and make up one of the most important industries and one of the most extensive entereprises in the entire country.

At the present time there are 39 railroad companies in Mexico—with a main line total of 20,095 kilometers (12,359 miles), not including industrial or private lines.

Mexico, with a territorial extension of 760,095 square miles is, after the United States, the country with the largest number of miles of railroad in relation to its territory on the American continent.

The Mexican railways connect at the northern border with the American roads at Matamoros-Brownsville, Nuevo Laredo-Laredo, Piedras Negras-Eagle Pass, Ciudad Juarez-El Paso, Agua Prieta-Douglas, Naco-Naco, Nogales-Nogales, Mexicali-Calexico and Tijuana-Tiajuana; in the south they connect with the Guatemalan border at Suchiate-Ayutla.

The greater portion of the Mexican railway mileage is of standard gage. Organization, as well as their administration, is very similar to that in the United States and Canada and in reality it can be said that the Mexican railways are operated on the same basis and system as the American roads. This favorable circumstance facilitates the interchange of cars with the American roads, which is carried on with the same ease as interchange with any other road of standard gage connecting within the country. It will be readily seen that this fact tends to promote international business and it is not infrequent that one sees trains running in Mexico made

Table I—Comparative Statement Showing Trains and Tonnage Handled and the Consumption of Fuel

Month	No. Trains		Metric-Ton-Kilometers		Train-Kilometerage		Barrels Oil		Kilograms of Coal	
	1928	1929	1928	1929	1928	1929	1928	1929	1928	1929
January	12,412	16,474	695,041,545	1,099,744,132	2,046,584	2,450,168	338,627	327,846	16,234,603	13,444,592
February	17,788	14,714	742,679,817	1,038,959,551	2,076,765	2,228,781	343,292	297,851	15,847,393	12,364,564
March	14,115	15,045	849,774,137	791,023,009	2,237,138	1,997,285	370,908	299,402	17,696,877	8,067,890
April	12,663	17,649	989,796,869	1,120,820,148	2,112,877	2,450,077	337,425	326,375	16,122,777	15,151,587
May	15,459	17,342	1,099,226,077	1,146,391,518	2,493,002	2,580,744	338,420	340,907	15,503,712	15,150,083
June	14,031	16,469	1,051,989,339	1,210,165,104	2,264,009	2,447,076	316,901	331,962	13,824,982	13,555,785
Totals	86,468	97,690	5,428,507,784	6,407,103,462	13,230,375	14,154,131	2,045,573	1,924,343	95,240,344	77,734 501

up entirely of American and Canadian equipment, with the exception of the locomotive and the caboose.

The Republic of Mexico being a country of limited fluvial and maritime communications, 90 per cent of the volume of its transportation is handled by the railroads, and this form of transportation constitutes, as in the United States, the prinicipal medium of material progress and development of its resources.

In Table II are given revenue, traffic and equipment statistics of the National Railways of Mexico in 1928.

Table II—Revenue, Traffic and Equipment Statistics, 1928

	U. S. Currency
Operating revenues	$81,369,361
Operating expenses	$79,056,915
Net revenues	$2,312,446
Operating ratio, per cent	97.16
No. of kilometers in operation	20,109
Revenue per kilometer	$4,049
Expenses per kilometer	$3,934
Net revenue per kilometer	$115
Metric Tons of Freight Handled	
Forest products	1,465,801
Agricultural products	3,767,883
Animals and their products	290,277
Inorganic products (minerals)	5,729,923
Merchandise in general	1,287,756
Company material	3,474,784
Other unspecified freight	755,933
Grand total	16,772,357
Percentages	
Forest products	8.64%
Agricultural products	22.64%
Animals and their products	1.72%
Inorganic products (minerals)	34.16%
Merchandise in general	7.68%
Company material	20.72%
Other unspecified freight	4.51%
Passenger Traffic	
Number of passengers handled	22,696,014
Passengers-kilometer	1,515,034
Average distance hauled per passenger (kilometers)	72
Total passenger revenue	$18,858,498
Average revenue per passenger	0.90
Average revenue per passenger-kilometer	0.012
Steam Locomotives on the Mexican Railways	
Wood burners	94
Coal burners	285
Oil burners	1,151
Total	1,530
Freight Equipment	
Box cars	9,695
Flats	2,992
Gondolas	4,227
Stock cars	1,352
Tanks	2,777
Refrigerators	56
Cabooses	455
Total	21,554
Passenger Equipment	
Passenger coaches	797
Sleeping cars	38
Baggage and mail cars	231
Private cars	81
Various (miscellaneous)	17
Total	1,164

In addition to the passenger equipment shown in the table, the Mexican railways handle a considerable number of Pullman cars in their trains.

Operating ratios by months in 1929 as compared with 1928 show that the railways are improving their efficiency and that the country as a whole is making economic progress. These ratios follow:

Operating Ratios

	1928	1929
January	89.61	82.21
February	88.58	85.85
March	82.94	*103.89
April	84.87	83.09
May	85.17	85.05
June	84.68	80.07
July	89.58	79.16

* During March and April the country suffered military disturbances.

The National Lines of Mexico use Mallet, Consolidation, Mikado and Pacific type locomotives. The total of locomotives of these types in service is as follows:

Narrow gage oil burners	214
Standard gage oil burners	763
Standard gage coal burners	125
Total	1,102

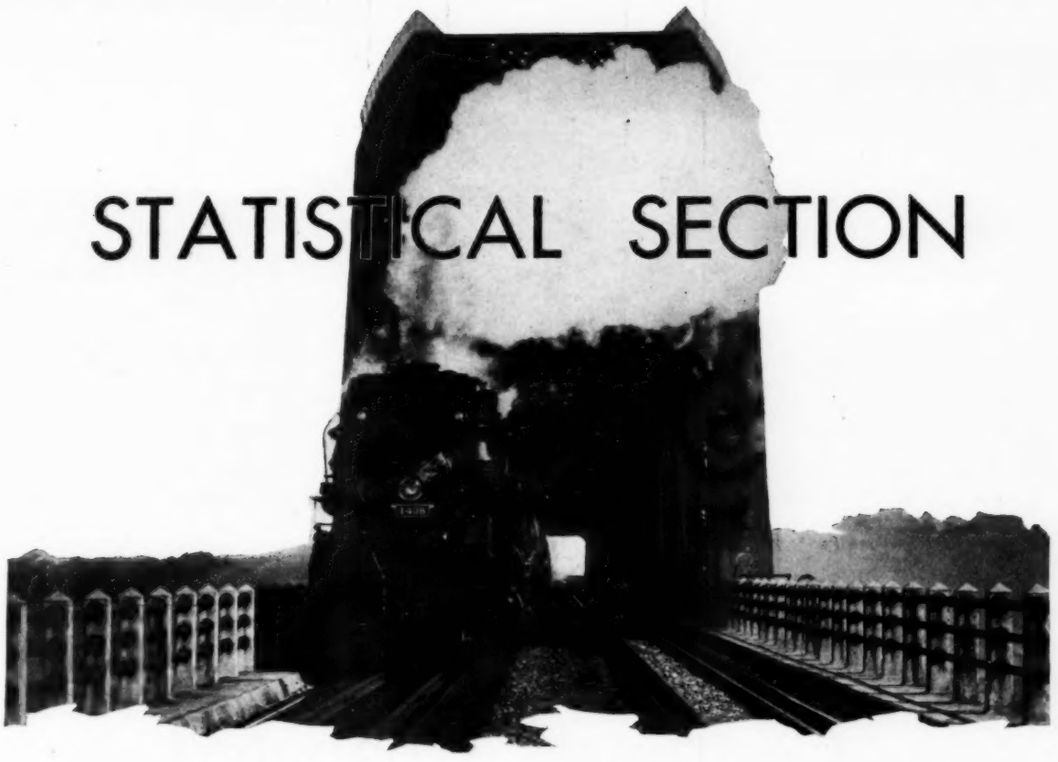
During 1928-29, tests were undertaken with a dynamometer car on the principal divisions of the system, and as a result the draft apparatus of the locomotives was modified, through which means we obtained an average of 12 per cent increase in tractive force, and a 15 per cent increase in tonnage handled, through the decrease of back pressure.

Fuel saving has been given special attention and conservation measures have been adopted Special records are kept through which the consumption of fuel is controlled and wastes avoided. The saving obtained represents an average of 6 per cent, as shown in an accompanying table, this table also giving comparisons of trains, train-kilometrage and ton-kilometrage for the first six months of 1929 as compared with the same period of 1928.

* * * *

An Express Train on the German Railways

STATISTICAL SECTION



Railway Construction Activity Continues Unabated
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Railway Finances in 1929
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Locomotives Ordered in 1929
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The 1929 Rail Motor Car Orders
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Motor Transport Looms Larger in Railway Picture
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Shop Tools and Equipment Ordered During 1929
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Signaling Construction Increased During 1929
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1929 Witnessed Marked Increase in Communication Plant
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The Alturas Line of the Southern Pacific Was Placed in Service September 15, 1929

Railway Construction Activity Continues Unabated

Heavy expenditures made for improvements—Large mileage of new lines under construction and projected

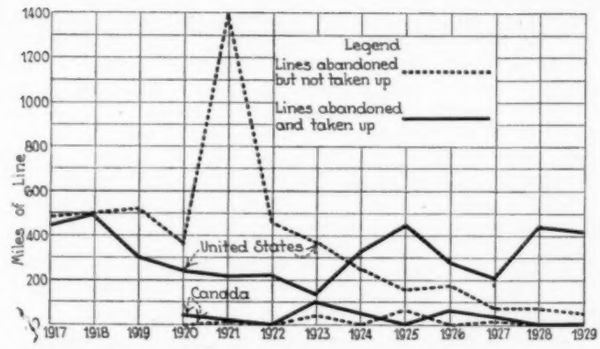
By Geo. E. Boyd
Associate Editor, *Railway Age*

THE widespread activity which has been so prominent a feature of railway construction during recent years continued at even an accelerated rate during 1929. Although the mileage of new lines and of multiple tracks built was smaller than for 1928, the year was characterzed by heavy expenditures for additions and betterments to roadway and structures and by the magnitude of many of the projects which are in progress or were completed. The mileage of new lines completed during 1929 was 666, as compared with 1,025 during the preceding year, a decrease of 359 miles or approximately 35 per cent. This is also less than for any year since 1926, but larger than for any year between 1919 and 1926. However, the mileage of lines now under construction or projected for 1930 forecasts a larger total for next year.

At the close of the year there were 630 miles of new lines still under construction, while 1,186 additional miles were authorized, under survey or projected by existing railways. In addition to this large mileage 2,333 miles are contemplated by other companies, the largest single project of this character being the Wyoming-Montana, which has applied to the Interstate Commerce Commission for authority to construct approximately 600 miles of new lines in these states, and which has already awarded the contracts for this construction, contingent upon the approval of the commission.

The mileage of second track completed during the year was again smaller than that of the preceding year, the total of 181 miles being a decrease of 90 miles, or approximately 33 per cent, as compared with 1928. It is interesting to note that, while the volume of traffic handled by the railways has increased steadily, since 1925, there has been a marked decrease in the mileage of second track construction, indicating a more intensive use of existing facilities. This has been made possible primarily by the extensive installations of signaling, interlocking plants, remote control of power switches and of centralized dispatching, which have been made by the railways on their heavier traffic lines, as well as by the use of heavier power.

As in previous years, the major projects among the new lines fall in three classifications: Those which are built to furnish new traffic routes; those to provide shorter lines or easier grades along existing routes; and those to develop new territory or industrial centers. The most prominent in the first classification is the line of the Southern Pacific between Klamath Falls, Ore., and Alturas, Cal., 95.4 miles, which not only provides an entirely new route for traffic moving between Portland, Ore., and Ogden, Utah, but also shortens the distance between these points over the Southern Pacific by more than 200 miles, at the same time providing easier grades and reducing the amount of curvature. The new 46.5-mile line of the Detroit, Toledo & Ironton, between Petersburg, Mich., and Malinta, Ohio, belongs in the second class. This line, which was constructed



Miles of Lines Abandoned in the United States and Canada

with a maximum gradient of 0.3 per cent, obviates the necessity for pusher service which was required in both directions on the old line, eliminates the need for trackage rights over the New York Central between Durban, Mich., and Tecumseh, and effects a saving of 22 miles in distance.

Among the lines constructed for the purpose of developing new territory are included the line of the Atchison, Topeka & Santa Fe between Pampa, Tex., and Cheyenne, Okla., 80.5 miles; the extension of the Beaver, Meade & Englewood from Hooker, Okla., to Hough, 20 miles; the line built by the Chicago & North Western from Winner, S. D., to Wood, 33.6 miles; the line between Stinnet, Tex., and Liberal, Kan., which was built by the Chicago, Rock Island & Pacific; and the line of the Georgia & Florida from North Augusta, S. C., to Greenwood, 57 miles.

New Track Built in 1929

United States	Number of companies building	First track	Second track	Third track	Fourth or more track	Total
Alaska	1	0.30	....	....	....	0.30
Arkansas	3	29.23	5.05	....	....	34.28
California	2	113.69	11.90	1.62	1.63	128.84
Colorado	1	5.25	....	....	....	5.25
Connecticut	1	....	....	....	1.01	1.01
Delaware	1	0.01	....	....	....	0.01
Florida	1	9.57	....	....	....	9.57
Illinois	3	....	3.85	7.87	....	11.72
Indiana	3	4.31	21.00	1.85	1.92	29.08
Iowa	1	2.70	2.70	....	....	5.40
Kansas	3	2.62	12.30	....	....	14.92
Kentucky	1	....	4.52	....	....	4.52
Louisiana	3	....	29.28	....	....	29.28
Maine	1	0.73	....	....	....	0.73
Michigan	5	21.93	6.04	....	....	27.97
Missouri	3	51.13	0.03	....	....	51.16
Montana	1	....	2.72	....	....	2.72
Nevada	1	....	17.82	....	....	17.82
New Jersey	1	....	....	1.26	....	1.26
New York	3	....	9.29	3.37	3.36	16.02
North Dakota	1	....	22.98	....	....	22.98
Ohio	3	29.31	6.56	12.33	2.36	50.56
Oklahoma	3	85.90	3.10	....	....	89.00
Oregon	1	19.96	....	....	....	19.96
Pennsylvania	4	10.26	11.29	....	....	21.55
South Carolina	1	57.00	....	....	....	57.00
South Dakota	1	33.61	....	....	....	33.61
Tennessee	1	2.50	....	....	....	2.50
Texas	7	158.82	....	....	....	158.82
Utah	2	5.67	9.94	....	....	15.61
Washington	1	....	0.49	....	....	0.49
West Virginia	2	21.48	....	11.55	....	33.03
Total, United States		665.98	180.86	39.85	10.28	896.97
Canada						
Quebec		7.90	....	....	....	7.90
Ontario		9.42	1.48	....	....	10.90
Manitoba		85.50	18.61	....	....	104.11
Saskatchewan		551.03	....	....	....	551.03
Alberta		187.30	....	....	....	187.30
Total, Canada		841.15	20.09	....	....	861.24

Texas Is Again First in New Mileage

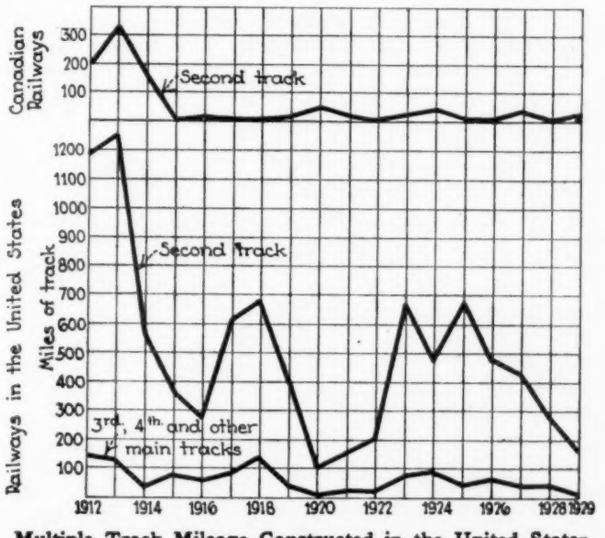
For the second time in two years Texas leads in the construction of new lines, although the 150 miles which were completed in this state in 1929 was slightly less than half the mileage constructed during the preceding year. California stepped into second place with 114 miles; Oklahoma ranked third with 86 miles and South Carolina was fourth with 57 miles.

At the close of the year, a somewhat larger mileage of new lines was under construction or had been placed under contract than at the end of 1928. Among the larger project of this character are included the lines under construction by the Kansas City, Mexico & Orient between Paisano, Tex., and Presidio, 72.7 miles, and between San Angelo, Tex., and Sonora, 64.2 miles; the Levisa river line of the Norfolk & Western; the line between Lane City, Tex., and Guy, 18 miles, which is being constructed by the Santa Fe under the name of the Cane Belt; and the Chicago, Rock Island & Pacific line between Coburn, Mo, and Polo, 38.6 miles. The Levisa river project of the Norfolk & Western, which is being carried out through a subsidiary, the Big Sandy & Cumberland, includes the rehabilitation of 12 miles of narrow gage line between Devon, W. Va., and Hurley, Va.; the construction of 14 miles of new line between Hurley and the mouth of Home creek on the Levisa river; and the reconstruction of 13 miles of non-carrier narrow gage line from the latter point near Grundy, Va., to the Virginia-Kentucky state line. When this work is completed it will provide 39 miles of standard gage line between these points.

Mileage of New Lines Is Increased in Canada

The mileage of new lines constructed in Canada showed a considerable increase in 1929 over the previous year, being 841 miles as compared with 722 in 1928, an increase of approximately 17 per cent. This mileage is greater than for any year since 1914 when practically all construction activity was stopped by the outbreak of the World War. It was also 175 miles, or approximately 26 per cent, greater than the mileage completed in the United States. As in recent years, most of this mileage consisted of branches or extensions of branches in the prairie provinces of Saskatchewan, Alberta and Manitoba, only a small mileage being built in Ontario and Quebec. Of this year's total, 295 miles were constructed by the Canadian National and 546 miles by the Canadian Pacific.

Rail was laid on 43.5 miles of the Hudson Bay Railway during the year, thus completing the rail laying on this 510-mile line into Fort Churchill. The line will not be ready for operation for two or three years, however, owing to difficulties which have been encountered in



Multiple Track Mileage Constructed in the United States and Canada

maintaining the track through the muskeg country which it penetrates. The first layer of ballast has been placed, but it is expected that a second and a third heavy lift will be required before stable track conditions are obtained.

Railway Construction in Mexico

Railway construction in Mexico, which has been practically at a standstill for a number of years, showed considerable activity during the year. Three lines of short mileage were completed and the three major projects under construction were prosecuted actively, 112 miles having been completed and turned over for operation during the year. In addition to the lines already under construction are three lines, the first from Empalme de

Miles of New Line Completed in the United States Since 1893

1893	3,024	1912	2,997
1894	1,760	1913	3,071
1895	1,420	1914	1,532
1896	1,692	1915	933
1897	2,109	1916	1,098
1898	3,265	1917	979
1899	4,569	1918	721
1900	4,894	1919	686
1901	5,368	1920	314
1902	6,026	1921	475
1903	5,652	1922	324
1904	3,832	1923	427
1905	4,388	1924	579
1906	5,623	1925	644
1907	5,212	1926	1,005
1908	3,214	1927	779
1909	3,748	1928	1,025
1910	4,122	1929	666
1911	3,066		

el Oro to Sierra Mojado, the second from San Carlos to Villa Acuna and the third from El Salto to Mazatlan, which is an extension of the line between Durango and Mazatlan, the authority for the construction of which has already been issued. The outstanding feature of the railway construction program in Mexico, is, however, the large mileage of new lines which are already under survey or projected, details of which are given in the construction reports in another column. The National Railways of Mexico have carried on the construction of large locomotive and car repair shops at Monterey during the year.

New Second Track Mileage

The greater part of the second track mileage completed during the year was built by a few of the larger western railways, including the Southern Pacific, the Great Northern, the Texas & Pacific, the Chicago, Burlington & Quincy, the Atchison, Topeka & Santa Fe, the Cleveland, Cincinnati, Chicago & St. Louis and the New York, Chicago & St. Louis. Much of the remaining mileage of second track consisted of short stretches to fill gaps which had previously been left because of the cost of construction. The Southern Pacific, with 32 miles of second track, completed the largest mileage for any one road, although the longest continuous stretch was built by the Great Northern between Williston, N. D. and Snowdon, Mont., 25.7 miles.

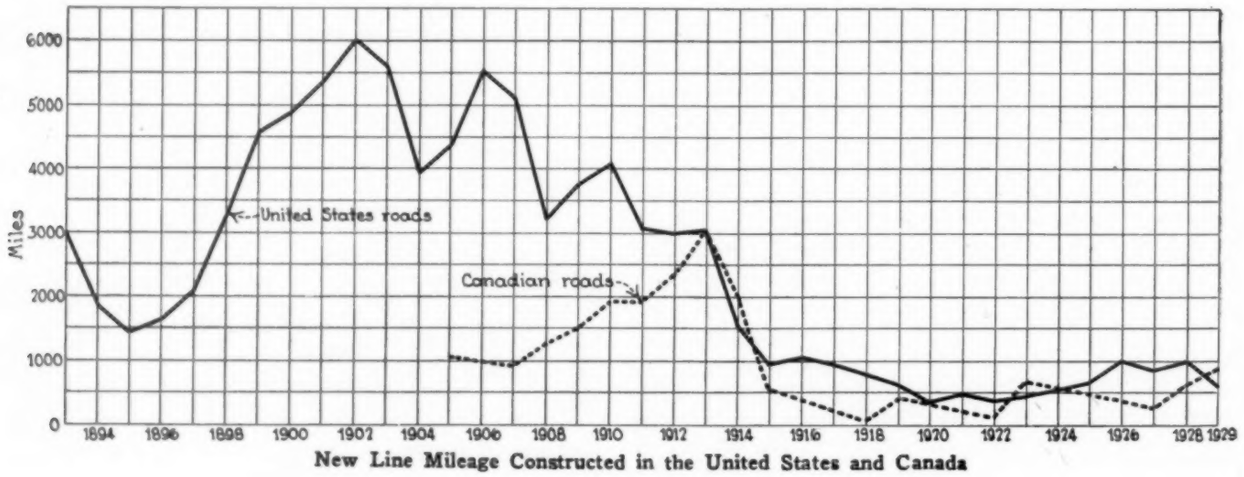
The Texas & Pacific also built a continuous stretch of 22 miles between McCall, La., and Addis and has practically completed the remaining distance to Donaldsonville. The placing in service of 19 miles of second

Miles of New Lines Completed in Canada Since 1904

1904	316	1917	207
1905	1,181	1918	135
1906	1,007	1919	433
1907	976	1920	305
1908	1,249	1921	252
1909	1,488	1922	145
1910	1,844	1923	655
1911	1,898	1924	615
1912	2,232	1925	414
1913	3,013	1926	335
1914	1,978	1927	310
1915	718	1928	723
1916	290	1929	841

track by the Chicago, Burlington & Quincy between Stockholm, Wis., and Hager, along the Mississippi river, completed the double-tracking of its line between Savanna, Ill., and St. Paul, Minn., approximately 300 miles. The Atchison, Topeka & Santa Fe extended its double track from Burrton, Kan., to Hutchinson, giving it a continuous double track from Chicago to Hutchinson, 669 miles. The Detroit & Toledo Shore Line completed the remaining 3.4 miles of second track which was needed to provide double track on all of its lines between Detroit, Mich., and Toledo, Ohio. The Cleveland, Cincinnati, Chicago & St Louis built 11 miles of second track from Muncie, Ind., to Anderson, while the New York, Chicago & St. Louis completed 9.7 miles between Montmorenci, Ind. and Templeton.

The Chicago & North Western completed eight miles of third track on its heavy traffic suburban line between Gladstone Park, Ill., and Des Plaines, which completes the three-track line to the latter point, while another extension to Barrington, Ill., approximately 15 miles, is under construction. The Chicago, Burlington & Quincy has 15 miles of third track under construction between Earlville, Ill., and Mendota, which, when completed early next year, will give it a continuous three-track line from Chicago to Mendota, 80 miles. The next largest third track project was completed by the Cleveland, Cincinnati, Chicago & St Louis at Cleveland, Ohio, in



New Line Mileage Constructed in the United States and Canada

connection with the westerly approach to the new Cleveland Union station, 11 miles.

Many Projects of Magnitude Under Construction

The Pennsylvania has continued work on its electrification project between New York and Philadelphia, Pa., which will cost upwards of $100,000,000 when completed. Work has also been prosecuted actively on the new through passenger station which this company is constructing at a cost of more than $50,000,000 at West Thirty-second street, Philadelphia, while progress has been rapid on the new office building which is being erected at a cost of $6,000,000 in connection with the Broad street suburban station in the same city.

Another electrification project upon which rapid progress has been made is that of the Reading which covers a large mileage of suburban lines leading out of Philadelphia, and which, together with grade separations and track changes which are an integral part of the improvement, will cost around $20,000,000. The Delaware, Lackawanna & Western has continued work on the electrification of its suburban lines in New Jersey —now 30 per cent completed.

The New York Central has practically completed the electrification of its Yonkers branch, its 30th Street branch at New York and its main line through Cleveland, Ohio, in connection with the new Union station at that point. The total cost of these projects, with incidental work in connection therewith, approximates $23,000,000. The Illinois Central has continued the electrification of its Chicago terminal, the work done during the year having consisted principally of erecting the overhead propulsion lines on its freight and yard tracks north of Thirty-fifth street.

The largest single project which was undertaken during the year was the West Side improvement of the New York Central at New York, which involves an expenditure of approximately $175,000,000 and calls for the elevation and relocation of its tracks on Manhattan Island, and the elimination of 90 street crossings at grade. Another project of great magnitude which was started during the year is the water-rail terminal which the Pennsylvania is constructing at Jersey City, N. J., and which when completed will cost approximately $50,000,000. This company has entered into an agreement with the City of Newark, N. J., for the construction of new passenger facilities in that city at a cost of $25,000,000.

Extensions and improvements to yards and engine terminals continued to call for large expenditures during the year. The largest single project of this character which was completed during the year was the Proviso yard of the Chicago & North Western, near Chicago, at a cost of $3,000,000. The enlargement of Grogan yard on the Pennsylvania at Columbus, Ohio, was completed at a cost of $1,790,000. Yard, engine terminal and shop improvements at various points on the Chesapeake & Ohio were completed during the year at a cost of more than $11,000,000; important yard improvements on the New York Central cost $11,000,000.

The improvement of passenger facilities at many points was another type of work that called for large expenditures. The New York Central completed its passenger station at Buffalo, N. Y., at a cost of $14,000,000. The Reading placed its Broad street station in Philadelphia, Pa., which cost $1,700,000, in service late in the year. The Pennsylvania's passenger station at Lancaster, Pa., was completed at a cost of $1,290,000, while the same road's enlarged facilities at the Journal Square station, Jersey City, N. J., cost $1,120,000. Improvements made, or in progress, at the Grand Central terminal at New York, by the New York Central, totaled $1,757,000. The Terminal Railroad Association

Lines Abandoned in the United States and Canada

	Lines abandoned and taken up Miles	Lines abandoned but not yet taken up Miles
United States		
Atchison, Topeka & Santa Fe		
Torrance, N. M., to Willard	35.30	
Kennedy, N. M., to Santa Fe	20.30	
Pueblo, Colo., to Portland	24.60	
Baltimore & Ohio		
Millersburg, Ohio, to New Wooster	18.00	
Savage, Md., to Guilford	2.98	
Bangor & Aroostook		
Sherman, Me		0.78
Beaver Dam		
Damascus, Va., to Va.-Tenn. state line	1.42	
Central Railway of Arkansas		
Fourche Jct., Ark., to Plainview	4.20	
Chicago & Northwestern		
Antigo, Wis., to Casper	25.33	
Shorewood, Wis., to Fox Point	4.29	
Easton, Wis., to Tower SW	1.03	
Chicago, Burlington & Quincy		
New Castle, Wyo., to Cambria	7.00	
Chicago, Rock Island & Pacific		
Elmira, Iowa, to Iowa City	7.70	
Edgerton Jct., Mo., to Wallace	12.82	
Delaware & Hudson		
Davenport Jct., N. Y., to Hemlock Crossing	3.66	
Hemlock Crossing to Davenport Center	4.01	
Denver & Rio Grande Western		
Moffat, Colo., to Cottonwood	16.96	
Crested Butte, Colo., to Floresta	11.41	
Engleville Jct., Colo., to Engleville		6.22
Detroit, Toledo & Ironton		
Petersburg, Mich., to Dundee	4.74	
Jackson, Ohio, to Cornelia		17.43
Petersburg, Mich., to Dundee		2.24
Elwood, Anderson & Lapelle		
Elwood, Ind	1.41	
Illinois Central		
Deer, Tenn., to Tiger Tail	12.09	
Stevens Jct., Tenn., to Menglewood	3.68	
Kinston Carolina		
Kinston, N. C., to Beulaville	29.00	
Louisville & Nashville		
At Myrlin, Ky	0.91	
Glidden, Ky., to Cawood	2.72	
Nashville, Chattanooga & St. Louis		
Fayetteville, Tenn., to Capshaw, Ala	36.91	
Missouri Pacific		
Herrin, Ill., to Energy	1.30	
Oronago, Mo., to end of track	1.36	
Luna, Ark., to Lake Village		6.27
Tioga, La., to Camp Beauregard		0.98
New York Central		
Evansville, Indianapolis & Terre Haute		
Washington, Ind., to Maysville	2.62	
Norfolk & Western		
Gilmerton branch	0.53	
Pennsylvania		
Peoria Jct., Ind., to Boone	9.03	
Jeffersonville, Ind.	0.80	
Jeffersonville, Ind		1.74
Pere Marquette		
What Cheer branch, Saginaw Co., Mich	3.70	
Reading		
Various places in Pennsylvania	2.38	
Red River & Gulf		
Concrete Hill, La., to Louisiana Jct	2.00	
St. Louis-San Francisco		
Wier City, Kan	2.48	
Tipperary, Ark	0.91	
Salem, Winona & Southern		
Horse Hollow, Mo., to Winona Jct	19.00	
Sardis & Delta		
Sardis, Miss., to Baptist	13.00	
Southern Pacific		
Deming, N. M., to Hermanas	32.38	
Treadwell Jct., Cal., to Porque	2.40	
Perrydale, Ore., to Dallas	10.04	
Monmouth, Ore., to Airlie	9.01	
Trinity Valley & Northern		
Fullerton, Tex., to Lumm	12.20	
Union Pacific		
Los Angeles & Salt Lake		
Easterly end of Pasedena branch		
Pasedena, Cal., to Arroya Park		1.30
Waycross & Southern		
Waycross, Ga., to Hopkins		20.00
Western Maryland		
Codorus, Pa., to Cold Springs	0.81	
Total	418.42	56.96
Canada		
Great Northern		
Abbotsford, B. C., to Kilgard		4.73
Newfoundland Railway		
Between Gaff Topsail and Hinds Junction	6.00	
Total	6.00	4.73

of St. Louis spent $4,000,000 to increase the passenger facilities at the St Louis, Mo., Union station. The most important passenger station project which is nearing completion is the Cleveland Union Terminal at Cleveland, Ohio, which cost $80,000,000 and which was 95 per cent completed at the end of the year. Another similar project which was started during the year is the Cincinnati, Ohio, Union station, which, when completed, will cost $41,000,000.

One of the outstanding features of the construction activities for 1929 was the number of important grade separation projects which were in progress or completed during the year. The number of improvements of this character was so large that only a few of the outstanding examples can be mentioned. This type of work in progress on the Baltimore & Ohio at Philadelphia, Pa., and Baltimore, Md., totals approximately $6,200,000. The Long Island started an extension of its grade separation work east of Jamaica, L. I, at a cost of $6,000,000. Grade separation between St. Clair street and 113th street, New York, was completed by the New York Central at a cost of $3,240,000. The track elevation which this company completed at South Bend, Ind., cost $8,000,000. This company also completed a project of the same character at Port Clinton, Ohio, at a cost of $3,388,000. The South Philadelphia track elevation at Philadelphia, Pa., was completed by the Pennsylvania at a cost of $5,575,000. The Belt Railway of Chicago completed the elevation of its tracks between Indiana and Colfax avenues, Chicago, at a cost of $4,675,000. The Reading is eliminating grade crossings at Manayunk, Pa., at a cost of $4,500,000. The Indianapolis Union Railway began a grade separation project at Indianapolis, Ind., which will cost $13,000,000 when completed.

Important bridge work in progress or completed during the year included the Passaic River bridge of the Pennsylvania at Newark, N J., which is a part of the passenger improvements already mentioned; this company's bridge over the Allegheny river at Oil City, Pa., which will cost $1,390,000; the bridge which the Reading is constructing over the Susquehanna river at Muncy, Pa, at a cost of $1,015,000; the Atchafalaya bridge, costing $2,000,000, which the Texas & Pacific completed at Melville, La.; and the Maumee River bridge which the Toledo Terminal will complete next year, at an expenditure of $1,330,000.

Water service projects of importance were the development and improvement of supplies in West Texas by the Texas & Pacific; the installation of 19 water treating plants in the same territory by the Southern Pacific and additional water facilities by this company at Coyote, N. M., which involved the construction of 10 miles of pipe line; and the additional water supply and storage at Las Vegas, N. M., by the Union Pacific.

Decrease in Mileage of Abandoned Lines

There was a slight decrease in the mileage of lines abandoned in the United States, the total of 475 miles comparing with 512 miles in 1928, a decrease of 37 miles. The margin between new construction and abandonments was great enough however, to give a net increase in the main track mileage for the country of 191 miles, as compared with a net increase of 513 miles in the preceding year. This is the fourth year since 1916 in which the new lines constructed exceeded the mileage of lines abandoned. The largest abandonment made by any one road was that of the Atchison, Topeka & Santa Fe, which abandoned 80 miles, the total being made up of three lines. The Southern Pacific came next with four abandonments which total 54 miles. The largest single abandonment was that of the line of the Nashville, Chattanooga & St. Louis between Fayetteville, Tenn., and Capshaw, Ala., 37 miles.

Railway Construction in the United States in 1929

Akron, Canton & Youngstown

Important Work Undertaken: Development of industrial district, drainage, tracks, water, sewers and roads, Akron, Ohio, $120,000 (completed).

Alaska Railroad

First Track: On Moose Creek branch, 0.3 mile.
Important Work Undertaken: Ballasting and widening embankments, $131,000 (70 per cent completed).

Atchison, Topeka & Santa Fe

First Track: (Clinton & Oklahoma Western) Pampa, Tex., to Cheyenne, Okla., 80.46 miles.
Second Track: Burrton, Kan., to Hutchinson, 12.30 miles. Through Waynoka, Okla., 3.10 miles.
Important Work Undertaken: Elimination Crawford avenue grade crossing, Chicago, (completed). Construction of Sixth avenue viaduct, Topeka, Kan., (completed). Mechanic street subway, Emporia, Kan., (completed). Renewal of bridge 91-A, Streator, Ill., (completed). Renewal of bridge 132-I, Shawnee, Okla., (completed). Renewal of bridge 385-B, Oklahoma City, Okla., (20 per cent completed). Renewal of bridge 1006-A with five truss spans, Rio Grande division, (80 per cent completed). Renewal of Middle river bascule lift-bridge, Valley division, (completed). Renewal of Alhambra viaduct, Valley division, (completed). Construct new bascule lift span, bridge B-1124, Woodsbro, Cal., (20 per cent completed).

Change of line, Topeka, Kan., to Pauline, (completed). Change of line, Speiss, N. M., to Kennedy, (completed). Construction of mechanical department facilities, Emporia, Kan., (completed). New car repair shed, Richmond, Mo., (completed). Enlarge district terminal yards, Emporia, Kan., (completed). Alterations to yard, Waynoka, Okla., (completed). Freight transfer house, Chicago, (completed). New passenger station and Harvey house, Newton, Kan., (40 per cent completed). New station and Harvey house, Winslow, Ariz., (80 per cent completed). Apprentice school and fire department buildings, Topeka, Kan., (10 per cent completed). New office building, Wellington, Kan., (completed). New water supply reservoir, Galesburg, Ill., (completed). Locomotive coaling facilities, Galesburg, (completed).

(Gulf, Colorado & Santa Fe). New machine shop, Cleburne, Tex., (completed). Construction of power plant, Cleburne, (completed). Construction of new storehouse, Cleburne, (completed). Extension to inbound freight house and construction of outbound freight house, Dallas, Tex., (10 per cent completed). Installation of rock and tile drains, Southern division, Coleman, Tex., to Sweetwater, (completed).

(Cane Belt). Construction of new line, Lane City, Tex., to Guy, 18.3 miles.

(Panhandle & Santa Fe). Construction of subway at Broadway, Lubbock, Tex., (completed). Construction of general office building, Amarillo, Tex., (completed).

(Kansas City, Mexico & Orient of Texas). Construction of new line, Paisano, Tex., to Presidio, 72.7 miles. Construction of new line, San Angelo, Tex., to Sonora, 64.2 miles.

Baltimore & Ohio

Second Track: One hundred third street, Chicago, to Blue Island, 3.85 miles.
Important Work Undertaken: Track elevation and revision of line, Philadelphia, Pa., $4,400,000 (68 per cent completed). Grade crossing elimination, Baltimore, Md., $1,780,000 (70 per cent completed). Elimination of grade crossing, Russell street, Baltimore, $120,000 (completed). Separation of grades, Hyattsville, Md., $269,630 (85 per cent completed). Grade crossing elimination, Youngstown, Ohio, $283,500 (10 per cent completed). Grade crossing elimination E. Thornton street (first unit) Akron, Ohio, (work being done by Pennsylvania-B. & O. proportion, $125,000 (5 per cent completed). Separation of grades, Newark, Ohio, joint with Pennsylvania, B. & O. proportion, $499,489 (30 per cent completed). Track elevation, Seventy-ninth street to Western avenue, Chicago, including extension to storage yard and transfer tracks, $282,000, (85 per cent completed). Additional track elevation, Seventy-ninth street, Chicago, $245,000, (90 per cent completed). Reconstruction of bridge over Potomac river, Keyser, W. Va., $200,000 (80 per cent completed). Substitute heavier spans for bridge, Loveland, Ohio, $135,000 (completed).

Construction of industrial branch from Marley Neck branch, 2.67 miles, Baltimore, Md., $1,530,000 (70 per cent completed).

Relocation of main line and enlargement of freight yard, Robey Street, Chicago, $520,000 (completed). Relocation of main line, other track changes and construction of bascule lift bridge over new channel of Chicago river, $1,300,000 (60 per cent completed). Construction of third track, Columbus, Ohio, $442,000 (25 per cent completed). Strengthening bridges, construction of second track, extension of sidings and storage tracks, installation of heavier turntables and extensions and improvements to enginehouses, Fairmont, W. Va., to Lorain, Ohio, $2,097,729 (30 per cent completed). New coal storage yard and drawbridge over Grand river, Fairport, Ohio, $620,000 (95 per cent completed).

Additional merchandise facilities, Pier 7, Locust Point, Md., $225,000 (40 per cent completed). Improvements and additions to Pier 6, Locust Point, $309,000 (40 per cent completed).

(Staten Island Rapid Transit) grade separation Tompkins avenue, Staten Island, $400,000 (25 per cent completed). Grade separation, Lorraine avenue, Clifton, Staten Island, $209,000 (25 per cent completed).

Bangor & Aroostook

First Track: Sherman, Me., 0.73 mile.
Important Work Undertaken: Replacing seven bridges with heavier structures between Houlton, Me., and North Maine Junction, and instal-

lation of power driven turntables, Houlton, Me., and Millinocket, $360,000 (completed).

Beaver, Meade & Englewood

First Track: Hooker, Okla., to Hough, 20 miles (completed).
New Line Projected: Hough, Okla., to Keyes, 40 miles.

Bellefonte Central

Important Work Undertaken: Struble, Pa., to Fairbrook, 5.3 miles (80 per cent completed).
Important Work Projected: Preparing to assume operation of abandoned branch of Pennsylvania, Bellefonte, Pa., to Tyrone, 18.2 miles.

Belt Railway of Chicago

Important Work Undertaken: Track elevation between Ninety-third and Ninety-fifth streets, Chicago, extending from Indiana avenue to Colfax avenue, $4,675,000 (completed). Track elevation, Western avenue, Chicago, $350,000 (80 per cent completed).

Bessemer & Lake Erie

Third Track: Filer, Pa., to Coolspring, 10.16 miles.
Important Work Undertaken: Change of line, Filer, Pa., to Coolspring, $1,121,600 (completed).

Birmingham Southern

Important Work Undertaken: Extension of classification yard, Fairfield, Ala., $250,000 (95 per cent completed). Grade separation, Birmingham, Ala., $170,000 (80 per cent completed).

Canadian National (Lines in U. S.)

First Track: At South Bend, Ind., 1.68 miles.
Second Track: At South Bend, Ind., 1.68 miles.
Important Work Undertaken: Dequindre grade separation, involving 22 streets, Detroit, Mich., (to be completed 1933). Track elevation, Fifty-fifth to Seventy-first streets, Chicago (completed). Separation of grades, South Bend, Ind. (completed). Construction of bascule bridge to replace swing span, Black river, Port Huron, Mich. (completed).
Belt line extension, Pontiac, Mich., 6.63 miles (completed). Construct yard for General Motors Truck Company, Pontiac, Mich., (completed). Construction of engine terminal, Fontiac, Mich. (started).
Two-story freight house and extension to stores department building, Battle Creek, Mich. (to be completed in 1930). New freight house and transfer platform, Kedzie avenue, Chicago, (completed).

Central Railroad of New Jersey

Important Work Undertaken: Grade crossing elimination, Cranford, N. J., $2,300,000 (60 per cent completed).

Chesapeake & Ohio

First Track: Between Rupert, W. Va., and Duo, 4.93 miles.
Second Track: Emma, Ky., to Beaver Junction, 3.29 miles. Sciotoville, Ohio, to Wheeler, 4.24 miles.
Third Track: Barboursville, W. Va., to Guyandot, 6.08 miles. Huntington, W. Va., to Kenova, 5.47 miles. Big Sandy Junction, Ky., to Cattlesburg, 1.23 miles.
Important Work Undertaken: Rebuilding bridges, Newport, Ky., to Covington; grade separation through Covington; rebuilding Ohio river bridge to adapt it for highway use; constructing new railway bridge over Ohio river; rebuilding Cincinnati Inter-Terminal and constructing double track $11,702,100 (completed). Strengthening 11 bridges on Greenbrier subdivision, $253,000 (completed). Filling bridge No. 6013, Maysville, Ky., $221,000 (completed). Two highway bridges over Big Sandy river and C. O. tracks, and rearrangement and extension of station, Prestonsburg, Ky., $151,400 (60 per cent completed). Bridge and connecting track, Bryce, W. Va., to Beech Glen, $221,348 (completed).
Engine terminal improvements, Fulton, Va., $747,000 (completed). Engine terminal improvements, Clifton Forge, Va., $705,000 (completed). Rebuilding locomotive shops, Huntington, W. Va., $3,633,400 (completed). Freight car shops, Russell, Ky., $3,165,325 (completed). Engine terminal improvements, Stevens, Ky., $587,000 (completed). Light repair yard and buildings, Hinton, W. Va., $214,800 (75 per cent completed). Engine terminal improvements, Hinton, W. Va., $363,000 (80 per cent completed).
Extension of yard tracks, Strathmore, Va., $103,000 (completed). Extension of five yard tracks, Clifton Forge, Va., $302,000 (completed). Relocation of county road and construction of subway in eastbound yard, Russell, Ky., $1,015,000 (completed). Engine underpass and runaround track, Russell, Ky., $418,000 (completed). Installing car retarders and revising grades, westbound classification yard, Russell, Ky., $411,000 (completed). Relocation of main line and extension to four tracks in westbound yard, Hinton, W. Va., $632,400 (85 per cent completed).
Undergrade crossing, Miami, Ohio, $112,500 (completed). Converting Ona tunnel into open cut, Ona, W. Va., $713,300 (completed). Extension and improvements to hospital, Huntington, W. Va., $237,000 (85 per cent completed).
Important Work Projected: (Levisa River) New line, Millard, Ky., to Kentucky-Virginia state line, 28 miles. Marshall, W. Va., to a point 5.4 miles therefrom.
(Hocking Valley) Construction of coal and ore handling facilities, Presque Isle terminal, Toledo, Ohio, $6,129,000.

Chicago & Eastern Illinois

Important Work Undertaken: Subway under four tracks, Evansville, Ind., $135,000 (completed).

Chicago & North Western

First Track: Marenisco, Mich., northerly, 3.06 miles. Winner, S. D., to Wood, 33.61 miles.
Third Track: Gladstone Park, Ill., to Des Plaines, 7.87 miles.
Important Work Undertaken: Improvements and alterations, passenger station, Chicago, $145,000 (completed). Construction of branch, Marenisco, Mich., 3.06 miles, $120,000 (completed). Construction of third track, Gladstone Park, Ill., to Des Plaines, 7.87 miles, $905.000 (completed). Construction of third track, Des Plaines, Ill., to Barrington, 14.73 miles, $1,468,225 (to be completed July 1, 1930). Construction of line from Winner, S. D., to Wood, 33.61 miles, $1,439,700 (completed).
Construction of new yard, Proviso, Ill., $3,000,000 (completed). Construction of inbound and outbound freight facilities, in conjunction with new Merchandise Mart, Chicago, $1,338,334 (25 per cent completed). Construction of concrete dock warehouse, Milwaukee, Wis., $960,000 (completed). Construction of oil house and oil storage facilities, Chicago, $150,900 (completed). Alterations in basement, Madison street station, Chicago, $202,000 (completed).

Chicago, Burlington & Quincy

Second Track: Stockholm, Wis., to Hager, 19 miles, $1,300,000.
Third Track: Earlville, Ill., to Mendota, 15 miles, $308,000 (to be completed in 1930).
Important Work Undertaken: Strengthen Mississippi river bridge, Burlington, Iowa, $101,000, (completed). Engine terminal, Western avenue, Chicago, $220,000, (completed). Rearrange tracks west of Canal street, Chicago, $381,000, (30 per cent completed). Revision of passenger yard, Chicago, $1,305,000 (50 per cent completed). Power plant for passenger yard, Chicago, $162,000, (completed). Remodel service building, Chicago, $200,000, (completed). Remodel passenger station, Omaha, Neb., $500,000, (20 per cent completed). Addition to grain elevator, Gibson, Neb., $200,000, (completed). Addition to grain elevator, St. Louis, Mo., $700,000, (60 per cent completed).

Chicago, Milwaukee, St. Paul & Pacific

First Track: Sioux City, Iowa, 2.7 miles.
Second Track: Sioux City, Iowa, 2.7 miles.
Important Work Undertaken: Revision of alinement, Sioux City, Iowa, $435,000 (completed). Track elevation, Evanston, Ill., $2,250,000 (38 per completed). Mayfair track elevation, Chicago, $1,500,000 (97 per cent completed). Grade crossing separation, south of Center street, Milwaukee, Wis., 2.3 miles, $2,600,000 (60 per cent completed). Grade crossing separation north of Center street, Milwaukee, Wis., $2,500,000 (15 per cent completed). Construction of new freight yard, North Milwaukee, Wis., $375,000 (90 per cent completed).

Chicago, Rock Island & Pacific

First Track: Stinnet, Tex., to Hitchland, 49.78 miles. Hitchland, Tex., to Liberal, Kan., 44.53 miles.
Important Work Undertaken: New line under construction, Hickory Creek, Mo., to Polo. 38.62 miles.
Change of line, Oklahoma City, Okla., $2,255,000, (15 per cent completed). Grade revision, Minooka, Ill., $510,000 (completed).
Grade crossing elimination, Ft. Worth, Tex., $250,000 (20 per cent completed). Construction of subways and new depot, Gresham, Ill., $133,000 (completed). Elimination of grade crossings at various points on system, $800,000 (70 per cent completed). Rebuild floor in three spans of Government bridge, Davenport, Iowa, $126,000 (60 per cent completed). Rebuild bridge No. 1826, $126,000 (completed).
Extension of mechanical facilities, Armourdale, Kan., $266,000 (completed). Installation of direct steaming, Forty-seventh street, Chicago, $115,000 (completed). Steel car shop, El Reno, Okla., $385,000 (completed).
Rearranging and enlarging yard, Blue Island, Ill., $284,000 (completed). Additional yard facilities, Armourdale, Kan., $350,000 (75 per cent completed). Extension to yard, El Reno, Okla., $121,000 (completed).
Changes and improvements in station, Des Moines, Iowa, $216,000 (completed). New terminal facilities, Omaha, Neb., $275,000 (completed). New terminal facilities, East Des Moines, Iowa, $250,000 (completed).
Straightening Chicago river, Chicago, $2,250,000 (40 per cent completed). Flood control Arkansas division, $100,000 (70 per cent completed).

Cincinnati Union Terminal Company

Important Work Undertaken: Preliminary work, including grading and track changes, for construction of union passenger terminal, Cincinnati, Ohio, $41,000,000 (10 per cent completed).

Cleveland Union Terminal Company

Important Work Undertaken: Construction of a union passenger terminal, Cleveland, Ohio, $80,000,000 (95 per cent completed).

Colorado & Southern

First Track: New line in Colorado, 5.25 miles.
Important Work Undertaken: Reconstruction of water, air, steam and other facilities at shops, Denver, Colo., (completed).
Important New Work Under Survey: New line, Childress, Tex., to Pampa, 115 miles.

Colorado & Southwestern

Important Work Projected: New line, Montezuma Co., Colo., 12.0 miles, $125,000.

Delaware, Lackawanna & Western

Second Track: Kingsland, N. J., to Hackensack river, 1.26 miles.
Important Work Undertaken: Electrification of suburban zone (20 per cent completed). Relocation of main line, Bloomsburg branch, West Nanticoke, Pa., 1.5 miles, (completed). Elimination of Willowvale grade crossing, Chadwicks, N. Y., (95 per cent completed). Elimination of grade crossings at Indian road, Williamsville road and Broadway, Cheektowaga, N. Y. (90 per cent completed). Elimination of East Water street, Elmira, N. Y., (50 per cent completed).
New pier, 1,200 ft. by 40 ft., Jersey City, N. J., (completed). New freight terminal and warehouse, Jersey City, N. J., (80 per cent completed). Lake freight house, warehouse, office and waiting room and concrete dock for D. & C. Navigation Company, Buffalo, N. Y., (completed). Concrete coal trestle and pockets, South Brooklyn Terminal, N. Y., (90 per cent completed).

Denver & Rio Grande Western

Important Work Undertaken: Replacing wooden bridges with permanent structures, Colorado and Utah, $300,000 (completed). New industry and service tracks, various points, Colorado and Utah, 20 miles, $421,000 (completed).

Detroit & Toledo Shore Line

Second Track: Completion of double-track between Detroit, Mich., and Toledo, Ohio, 3.44 miles (completed).
Important Work Undertaken: Grade separation, Ecorse, Mich., $125,000 (completed). Replacing two-track pile trestle with three-track deck plate girder, Lang, Ohio, $106,000 (completed). New power plant and direct steaming, Lang, Ohio, $100,000 (completed).

Detroit, Toledo & Ironton

First Track: Petersburg, Mich., to Malinta, Ohio, $7,000,000, 46.50 miles.

Important Work Undertaken: Grade separation, Dearborn, Mich., $180,000 (completed). Elimination of State street crossing, Ecorse, Mich., $100,000 (completed). Rebuilding Paint Creek bridge, Greenfield, Ohio, $125,000 (85 per cent completed).

Duluth, Missabe & Northern

Important Work Undertaken: Replacement of bridge 2-A, Duluth, Minn., $560,000 (completed).

Erie

Important Work Undertaken: Elimination of Madison avenue grade crossing, Paterson, N. J., (completed). Elimination of Watt street grade crossing, Youngstown, Ohio (completed). Elimination of Andrews avenue grade crossing, Youngstown (completed). Grade crossing elimination, Wellsville, N. Y., (completed). Elimination of grade crossing, East Corning, N. Y. (80 per cent completed). Elimination of Harding grade crossing, Mansfield, Ohio (90 per cent completed). Elimination of Midway crossing, Laketon, Ind., (80 per cent completed). Grade separation, Hamburg, N. Y. $110,000.

Construction of new westbound yard and extension of classification tracks in present westbound yard, Hornell, N. Y. (completed). Improved yard facilities and installing a 120-ft. turntable, Meadville, Pa. (completed). New freight house and team tracks, Bloomfield, N. J. (completed). New freight house Elmwood avenue, Buffalo, N. Y. (completed).

Conversion of locomotive shops into coach repair shop, Susquehanna, Pa. (completed). Coal and ash handling plant and improved water facilities, Meadville, Pa. (completed).

Additional electrically operated float bridge, Jersey City, N. J. (90 per cent completed). Two-story lighterage pier, Jersey City, N. J. (10 per cent completed). Reconstruction of Pier D to provide open lighterage pier, 835 ft. long and 101 ft. wide, Weehawken, N. J., (90 per cent completed).

Florida East Coast

First Track: Belleglade, Fla., to Lake Harbor, 9.57 miles.

Galveston Wharf Company

Important Work Undertaken: Construction of 6,000,000 bu. elevator, Galveston, Tex., $2,850,000 (to be completed July 1, 1930).

Georgia & Florida

First Track: Extension from North Augusta, S. C., to Greenwood, 57.00 miles, $3,000.000 (completed).

Great Northern

Second Track: At Spokane, Wash., 0.49 mile. Williston, N. D., to Snowdon, Mont., 25.70 miles.

Important Work Undertaken: Additional yard facilities, Superior, Wis., $309,000 (completed). New engine terminal, Interbay, Wis., $423,000 (completed). Addition to enginehouse and new turntable, Havre, Mont., $133,000 (completed). Addition to enginehouse and new turntable, Whitefish, Mont., $133,000 (completed). Pumping station, pipe line and treating plant, Shelby and Naismith, Mont., $130,100 (completed). Office building, Seattle, Wash., $195,000 (completed). Service building addition to motor coach garage, Minneapolis, Minn., $102,800 (completed). Concrete snow shed, Singleshot, Mont., $210,00 (completed). Gravel washing and crushing plant, Flint, Minn., $140,000 (completed). Gravel washing and crushing plant, Verendrye, N. D., $135,000 (70 per cent completed).

Important Work Projected: (Lines under survey). Richey, Mont., to Winnett, 195 miles. Klamath Falls, Ore., to Bieber, Cal., 88 miles. Completion of line already graded, Lewistown, Mont., to Grassrange, 32.5 miles.

Gulf, Mobile & Northern

Important Work Undertaken: Grade revision, Ripley, Miss., 10 miles, $110,000 (completed). Extending passing sidings and replacing wooden culverts with permanent culverts, $150,000 (completed).

Illinois Central

Important Work Undertaken: Construction of subway, Eighty-seventh street, Chicago, $150,000 (75 per cent completed). Construction of freight house for New York, Chicago & St. Louis, Chicago, $160,000 (completed). New station and addition to yard, Monroe, La., $160,000 (60 per cent completed).

Indianapolis Union Railway

Important Work Undertaken: Elevation of six miles of line, to eliminate 22 street crossings and 6 railway crossings at grade, and construct five-track bridge over White river, Indianapolis, Ind., $13,000,000, (5 per cent completed).

Jacksonville Terminal Company

Important Work Undertaken: Construction of Beaver street viaduct, Jacksonville, Fla., $418,124 (completed).

Kansas City Southern

First Track: Leeds, Mo., to Grandview, 13.24 miles, $3,011,830.

(Arkansas Western) Extension from Waldron, Ark., 23.5 miles southeasterly, $395,718, (completed).

Second Track: Shreveport, La., 6.2 miles, (in connection with grade separation).

Important Work Undertaken: Reduction of grades, construction of double track and elimination of street and railway crossings at grade, Shreveport, La., $1,024,615, (completed). Grading and drainage preliminary to construction of yard and engine terminal, Dowling, Tex., $171,720 (completed).

Kansas City Terminal

Important Work Undertaken: Seven-track subway to eliminate grade crossing, Van Brunt boulevard, Kansas City, Mo., $240,000 (completed).

Lehigh Valley

Important Work Undertaken: Elimination of grade crossing, Williamsville, N. Y., (20 per cent completed). Elimination of grade crossing, Getzville road, Williamsville, N. Y., (20 per cent completed). Constructing bridge over Newark bay, Newark, N. J., (95 per cent completed). Replacing bridge over Frelinghuysen avenue, Newark, N. J. (completed). Renewing double track bridge, Aldene, N. J., (completed). Installation of car retarders, Coxton, Pa., (completed). Raising Oak Island yard in connection with bridge over Newark bay, N. J., (80 per cent completed). Construction of 12-story warehouse, New York, (completed). Construction of coal pockets, Henderson street, Jersey City, N. J., (completed).

Little River

First Track: Townsend, Tenn., 2.5 miles.

Long Island

Important Work Undertaken: Overhead bridge, Broad Hollow road, Farmingdale, L. I., $140,000, (completed). Undergrade bridge, Jerico turnpike, Syosset, L. I., $160,000, (completed). Undergrade bridge, South Country road, Hampton Bays, L. I., $180,000, (completed). Undergrade bridge, St. James road, Smithtown, L. I., $100,000, (completed). Undergrade bridge, South Country road, East Moriches, L. I., $110,000, (completed). Overhead bridge, South road, Southold, L. I., $120,000 (completed). Extended grade crossing eliminations through Auburndale, L. I. and Bayside, $2,000,000, (completed). Extended grade crossing elimination through Jamaica, L. I., $6,000,000 (15 per cent completed).

Longview, Portland & Northern

Important Work Undertaken: Construction of a line from Ryderwood, Ore., Northwesterly, 20 miles.

Louisville & Nashville

Important Work Undertaken: Construction of new line, Chevrolet, Ky., to Hagans, Va., 12.00 miles. Construction of new line, Fox Ridge, Ky., up Left Fork creek, 7.69 miles. Rebuilding 10 bridges, Anchorage, Ky., to Shelbyville, $154,000 (completed). Rebuilding eight bridges, Christiansburg, Ky., to Lexington, $609,000 (completed). Grade crossing elimination, track changes, etc., Birmingham, Ala., $4,000,000 (15 per cent completed). Underpass, Third avenue, Louisville, Ky., $350,000 (started). Two underpasses, and one viaduct, Covington, Ky., $365,000 (started). Shop buildings, enginehouse, train yard, coal and cinder handling and water facilities, Mobile, Ala., $300,000 (completed). Warehouse, Pensacola, Fla., (completed). Addition to general office building, Louisville, Ky., $800,000 (70 per cent completed).

Mayo & Cook's Hammock

Important Work Undertaken: Construction of line between Mayo, Fla., and Cook's Hammock, 15 miles, $200,000.

Missouri-Kansas-Texas

Important Work Undertaken: Reduction of eastbound ruling grade, St. Jo., Tex., to Nocona, $391,000, (completed). New 10-stall enginehouse, turntable, stores facilities, power plant and water treating plant, Fort Worth, Tex., $430,000, (completed). Construction and rearrangement of tracks preliminary to improving freight station facilities, Kansas City, Mo., $335,000, (completed).

Missouri Pacific

First Track: Illmo, Mo., to Cape Girardeau, 7.37 miles. Great Bend, Kan., to end of extension, 0.03 miles. Rich Hill, Mo., from F. S. & E. Jct., to Rich Hill Jct., 0.19 miles. Springfield, Mo., 0.01 miles.

(St. Louis, Brownsville & Mexico). Edcouch, Tex., to Weslaco, 10 miles.

(San Antonio, Uvalde & Gulf). Brundage, Tex., southerly, 5 miles.

Second Track: Convent street to La Salle street, St. Louis, Mo., 0.03 miles.

Important Work Undertaken: Construction of line, Illmo, Mo., to Cape Girardeau, $478,000 (92 per cent completed). Reduction of grades at four points, Chester, Ill., to Pinckneyville, $268,000 (80 per cent completed). Revision of alinement, reduction of grades and construction of second track, Lake Hill, Mo., to Eureka, 12 miles, $4,333,000 (20 per cent completed). Allenton, Mo., to Boles, 16.7, revision of alinement and construction of second main track, $4,960,800 (95 per cent completed). Revision of alinement and reduction of grades, Gypsum City, Kan., to Hoisington, $1,056,800 (started). Revision of alinement and reduction of grades, Osawatomie, Kan., to Council Grove, $2,711,100 (started). Raising grade above high water, Newport, Ark., to Bradford, 18 miles, and construction of second track, $1,796,000 (75 per cent completed). Extension of train yard and relocation of car repair facilities, Wichita, Kan., $124,200 (completed).

New bridge on improved alinement, Wellington, Mo., $193,000 (50 per cent completed). Reconstruction, replacement and strengthening of bridges, Jefferson City, Mo., to Bagnell, $148,000 (75 per cent completed). Filling and renewing part of north approach to White river bridge, Benzal, Ark., $292,000 (50 per cent completed). New bridge over Arkansas river, Little Rock, Ark., $1,568,500 (completed).

Extension to enginehouse and additional shop facilities, Poplar Bluff, Ark., $153,000 (Completed). Extension to enginehouse, Osawatomie, Kan., $182,000 (completed). Icing facilities and team tracks, Woodswether industrial district, Kansas City, Mo., $124,250 (completed). Construction of grain elevator, Kansas City, Mo., $286,000 (15 per cent completed). Preliminary work new freight house facilities, Little Rock, Ark., $480,000 (90 per cent completed). Incline and trestle track, Kellogg, Ill., $146,400 (completed). Reconstruction of double-track incline, East Ivory, Ill., $165,000 (completed). Long distance telephone circuit, Kansas City, Mo., to Pueblo, Colo., $156,300 (completed). Union station, Texarkana, Tex.-Ark., $495,000 (90 per cent completed).

(Cape Girardeau & Northern). Reconstruction of part of line, $237,900 (75 per cent completed).

(Gulf Coast Lines). Construction of coach shops, mill building and other facilities, Kingsville, Tex., $162,000 (completed).

(International-Great Northern). Rearrangement of yard, Austin, Tex., $109,000 (completed).

(San Antonio, Uvalde & Gulf). Connecting track to Texas-Mexican Railway, Corpus Christi, Tex., $214,700 (completed).

Missouri Southern

First Track: Hobart, Mo., to Brushy, 16 miles.

Mobile & Ohio

Important Work Undertaken: Eighteen-stall enginehouse, boiler-washing and water softening facilities, coal and ash handling plant and miscellaneous facilities, Monsanto, East St. Louis, Ill., $428,000, (completed).

Monongahela

First Track: Waynesburg, Pa., to Mather, 7.00 miles.

Montour

Important Work Undertaken: Transfer connection with Baltimore & Ohio, 2.3 miles, Pittsburgh, Pa., $231,172, (completed).

Mound City & Eastern

Important Work Undertaken: Construction of new line, Mound City, S. D., to Leola, 70 miles.

Nashville, Chattanooga & St. Louis

Important Work Undertaken: Construction of passenger terminal and incidental facilities, Atlanta, Ga., $577,000, (55 per cent completed).

New York Central

First Track: (Evansville, Indianapolis & Terre Haute) Jordan, Ind., to Maysville, 2.37 miles.

Second Track: Rockport, Ohio, 0.23 miles.

(Cleveland, Cincinnati, Chicago & St. Louis) Muncie, Ind., to Anderson, 11.0 miles.

Third Track: Garrison, N. Y., to Beacon, 3.37 miles. South Bend, Ind., 1.85 miles. Port Clinton, Ohio, 1.39 miles.

(Cleveland, Cincinnati, Chicago & St. Louis) Berea, Ohio, to Cleveland, 10.94 miles.

Fourth Track: Garrison, N. Y., to Beacon, 3.36 miles. South Bend, Ind., 1.92 miles. Port Clinton, Ohio, 1.39 miles.

(Cleveland, Cincinnati, Chicago & St. Louis) Cleveland, Ohio, 0.97 miles.

Important Work Undertaken: Viaduct to carry 238th street, Wakefield, N. Y., over tracks, $252,000 (25 per cent completed). Viaduct to carry 241st street, Wakefield, N. Y., over tracks, $920,000 (15 per cent completed). Elimination of grade crossing, Chappaqua, N. Y., $365,000 (95 per cent completed). Elimination of grade crossing, Nepperham, N. Y., $282,000 (completed). Grade separation, Gray Oaks, N. Y., $251,000 (95 per cent completed). Grade separation, Dyckman street, New York, $284,000 (completed). Grade separation between St. Clair place and 138th street, New York, $3,240,000 (completed). Elimination of Main street crossing, Cold Spring, N. Y., $188,000 (25 per cent completed). Grade separation, Rensselaer, N. Y., $450,000 (completed). Elimination of Nyack Turnpike grade crossing, West Nyack, N. Y., $223,000 (3 per cent completed). Elimination Mansion street crossing, Coxsackie, N. Y., $234,000 (45 per cent completed). Grade separation, Betsinger road, Sherrill, N. Y., $100,000 (completed). Grade separation, West Rome, N. Y., $166,000 (20 per cent completed). Grade separation, Brighton, N. Y., $345,000 (98 per cent completed). Harlem avenue grade separation, Forks, N. Y., $267,000 (40 per cent completed). Elimination of Forge Road, Thendara, N. Y., $124,000 (completed). Grade separation, Lake Clear Jct., N. Y., $148,000 (completed). Grade crossing elimination, Great Bend, N. Y., $137,000 (3 per cent completed). Grade crossing elimination, Evans Mills, N. Y., $199,000 (5 per cent completed). Grade separation, including change of line and four-track bascule lift bridge, Port Clinton, Ohio, $3,388,000 (completed). Grade separation, Toledo, Ohio, $634,000 (completed). Grade separation, Hastings and Russell streets, Detroit, Mich., $845,000 (completed). Track elevation, South Bend, Ind., $8,000,000 (completed). Grade separation, West 117th street and Berea road, Cleveland, Ohio, $920,000 (completed). Highway grade crossing elimination, Delta, Ohio, $274,000 (5 per cent completed). Subway, Southfield road, Ecorse, Mich., $232,000 (75 per cent completed). Grade separation, Green and Central avenues, Detroit, Mich., $162,000 (80 per cent completed). Replace overhead highway bridge, Millersburg, Ind., $106,000 (completed). Viaduct, 141st street, Indiana Harbor, Ind., $420,000 (completed). Subway, Chappel Road, Swanville, Pa., $176,000 (1 per cent completed). Subway, Athol Springs, N. Y., $276,000 (5 per cent completed). Widening Park avenue from 59th to 86th streets, New York, $390,000 (completed).

Replacing bridges M-2 and M-3, Melrose, N. Y., $105,000 (completed). New drawbridge over Overpeck creek and track changes, Little Ferry, N. Y., to Dumont, $1,300,000 (started). Reconstruction of bridge J-609, Syracuse, N. Y., $155,000 (completed).

Electrification main line, Yonkers branch, Sedgwick Avenue to Getty Square, Yonkers, N. Y., $1,416,000 (completed). Electrification of 30th street branch, Spuyten Duyvil to 30th street, New York, $3,285,000 (99 per cent completed). Electrification of 30th street branch, Hudson division, $147,000 (92 per cent completed). Electrification of 30th street branch, Spuyten Duyvil to Harmon, $3,550,000 (91 per cent completed). Additional main tracks and yard tracks, electrification of main tracks through new Union station and new station, East Cleveland, Cleveland, Ohio, $7,000,000 (90 per cent completed).

Duplicate intake tunnel at power house, Port Morris, N. Y., $325,000 (completed). High tension connection to Interboro Rapid Transit Lines, Port Morris, $103,500 (completed). Additional circuit breaker houses, Claremont Parkway to White Plains, N. Y., $112,800 (50 per cent completed). Underground transmission duct line, Botanical Gardens, N. Y., to Williamsbridge, $249,000 (five per cent completed). Duct lines and splicing chambers on north and south shores of Harlem river, Spuyten Duyvil, N. Y., $253,000 (75 per cent completed). Enlargement of Harmon power plant and addition to engine terminal facilities, Marble Hill, N. Y., to Croton, $3,798,000 (completed). Expansion of shop facilities, Harmon, N. Y., $2,684,000 (20 per cent completed). Construction of independent power line and new passenger stations, Albany, N. Y., to Syracuse, $1,250,000 (97 per cent completed). Electric substation, Ashtabula Harbor, Ohio, $144,000 (completed). Additional 2,000 kw. substation, Grand Central terminal, New York, $120,000 (completed). New substation and equipment, 43rd street, New York, $3,050,400 (60 per cent completed).

Construction of third and fourth track, Beacon, N. Y., to Garrison, $7,100,000 (completed). Construction of fourth track Chelsea, N. Y., to Poughkeepsie, $325,000 (40 per cent completed).

Extension of enginehouse stalls, Rensselaer, N. Y., $580,000 (completed). Track changes and ash conveyors, Wayneport, N. Y., $210,300 (completed). Extension to enginehouse stalls, Collingwood, Ohio, $381,250 (completed). Extension to enginehouse stalls and enlarge power plant, Air Line Jct., Ohio, $347,000 (completed). Installation of 100-ft. turntable, Ashtabula, Ohio (completed). New air-compressor building and compressor equipment, Elkhart, Ohio (completed). Additional engine terminal facilities, Gardenville yard, Depew, N. Y., $110,000, (completed).

Yard improvements and construction of Melrose Central building, Mott Haven, N. Y., $3,685,000 (60 per cent completed). Additional yard tracks, Bronx terminal market, Highbridge, N. Y., $206,000 (completed). Automobile facilities, Kingsbridge yard, Marble Hill, N. Y., $1,470,000 (75 per cent completed). Construction of team yard, 41st street, New York $340,000 (completed). Additional sidings, Philipse Manor, N. Y., $283,000 (completed). Installation of car retarders, De Witt yard, East Syracuse, N. Y., $2,000,000 (completed). Car retarders and additional tracks, Gardenville yard, Depew, N. Y., $900,000 (30 per cent completed). Extension of yard facilities, Wonalancet yard, Black Rock, N. Y., $560,000 (completed). Spur track for St. Joseph Lead Company, Emeryville, N. Y., $275,000 (completed). Construction of flat switching yard, yard buildings, car repair and icing facilities, Collinwood, Ohio, $1,128,000 (completed). Extension of yard and changes to permit right-hand operation, icing, stock-feeding and watering facilities, Collinwood, $425,000 (completed).

Extension of team track facilities, Collinwood, Ohio $181,000 (completed). Construction of new freight house, Weehawken, N. J., $322,000 (50 per cent completed).

Extensions to station platforms and canopies, New York Metropolitan district, $670,000 (completed). Extension of station platforms and canopies, New York to White Plains and Harmon, $850,000 (80 per cent completed). Improvements at station, Weehawken, N. J. $560,000 (35 per cent completed). Passenger terminal improvements, Buffalo, N. Y. $14,000,000 (completed). Railway terminal post office, Buffalo, $240,000 (80 per cent completed). Extension of platforms and construction of canopies, La Salle street station, Chicago, $100,000 (completed). Improvements at passenger station, Toledo, Ohio (completed).

Improvements at Grand Central terminal, New York: Removal of express facilities and conversion of platforms to passenger use, $140,000 (completed). Construction of passageway from New York Central building to terminal concourse, $144,000 (completed). Extension of loop track No. 200, $1,366,000 (50 per cent completed). Additional ticket office on express level, $107,000 (completed).

Strengthening Pier 1, New York, $112,000 (completed). Automobile service station and warehouse, 65th street, New York, $1,340,000 (completed). Milk and automobile facilities, 60th street yard, $1,550,000 (5 per cent completed). Additional belt conveyor, Pier 7, Weehawken, N. J., $120,000 (completed). Grain dryer, Pier 7, Weehawken, $390,000 (completed). Reconstruction of passenger ferry bridge, Weehawken, $846,000 (completed). Additions to Pier K, Weehawken, $1,100,000 (10 per cent completed). Reconstruction of Maumee River Dock, Toledo, Ohio. $254,000 (30 per cent completed). Straightening Chicago river, Chicago, $1,445,000 (65 per cent completed).

West Side improvement (purchase of property) New York, $23,600,000 (50 per cent completed). Water treating plants, Huron, Ohio, Air Line Jct., Stryker, Mina, Elkhart (engine terminal), Elkhart, (hump yard) and Chesterton, Ind., $487,000 (30 per cent completed). Extension of subway and construction of new icing facilities, Air Line Jct., Ohio, $148,000 (completed).

Important Work Projected: Line under survey, Keating, Pa., to Browns, $850,000.

(Boston & Albany). Construction of 25-stall enginehouse and power plant, Beacon Park, Mass., $1,017,000 (30 per cent completed). Construction of 18-stall enginehouse, West Springfield, Mass., $564,000 (25 per cent completed).

(Chicago River & Indiana). Track elevation 43rd to 47th streets, Chicago, $850,000 (completed).

(Cleveland, Cincinnati, Chicago & St. Louis). Grade separation, West Broad street, Columbus, Ohio, $243,000 (completed). Renewal and extension of three bridges, Guilford, Ind., $520,000 (70 per cent completed). Construction of second track and reduction of grades, Terre Haute, Ind., to Sanford, 7.6 miles. $3,000,000 (10 per cent completed). Construction of second track and grade reduction, Whitestone, Ind., to Colfax, 22 miles, $2,413,000 (10 per cent completed). Consolidation of facilities with New York, Chicago & St. Louis, to provide joint double track, Altamont, Ind., to La Fayette, $235,000 (10 per cent completed). Improvement of produce terminal, Cleveland, Ohio, $141,500 (50 per cent completed). Construction of westward receiving yard and addition to classification yard, Sharonville, Ohio, $1,241,000 (completed). Installation of car retarders, Sharonville yard, $518,000 (completed). Consolidation of passenger facilities with Pennsylvania, Union City, Ind., $135,000 (completed). Revision of passenger and freight main lines, additional yard and engine terminal facilities and electrification of terminal for westerly approach to new Union station, Cleveland, Ohio, $6,750,000 (completed).

(Evansville, Indianapolis & Terre Haute). Construction of cutoff, Washington, Ind., (completed).

Indiana Harbor Belt). Grade separation, Bellewood, Ill., $696,800 (2 per cent completed). Grade separation, Calumet City, Ill., $198,000 (20 per cent completed).

(Ohio Central Lines). Additional unit, Stanley yard, Toledo, Ohio, $1,700,000 (30 per cent completed). Additional car dumper, dock and other facilities, Toledo, Ohio, $1,500,000 (completed).

(Michigan Central). Grade separation, Toledo, Ohio, $290,000 (completed). Grade separation, West Fort street, Detroit, Mich., $182,657 (completed). Grade separation, Southfield road, Ecorse, Mich., $118,350 (completed). Grade separation, Outer drive, Dearborn, Mich., $192,000 (completed). Grade separation, Green and Central avenues, Detroit, Mich., $103,700 (completed). Reconstruction of bridge 2-50, East Gary, Ind., $342,000 (completed). Replace Kettle Creek viaduct, St. Thomas, Ont., $689,000 (completed). Replace three bridges, Niles, Mich., $179,000 (completed).

Installation of car retarders, West Detroit yard, Detroit, Mich., $845,000 (completed). Track changes, Marsh track serving Great Lakes Steel Corporation, Ecorse, Mich., $187,300 (completed). New freight house and team tracks, Windsor, Ont., $118,380 (completed). Preliminary work to enable construction of team tracks, Twenty-fifth street, Chicago, $800,000 (completed). Construction of produce warehouse, stores and office building, Detroit, Mich., $888,425 (completed). Construction of 600-ton coaling station, West Detroit, Mich., $100,000 (completed).

(Pittsburgh & Lake Erie). Additional freight yard facilities, Pittsburgh, Pa., $203,000 (25 per cent completed). Scrap reclamation plant, Davis Island shop, McKees Rocks, Pa., $102,000 (completed).

(Rutland). Erection of bridge across Winooski river, Burlington, Vt., to replace one destroyed in flood of November, 1927, $180,000 (98 per cent completed).

New York, Chicago & St. Louis

Second Track: Montmorenci, Ind., to Templeton, 9.7 miles.

Important Work Undertaken: Grade separation and approach to Cleveland Union terminal, Cleveland, Ohio, $17,000,000 (80 per cent completed). New freight yard, Cleveland, Ohio, $3,000,000 (90 per cent completed). Freight terminal, Cleveland, Ohio, $7,500,000 (completed). Replacing timber trestle with permanent bridge and filling approaches, Coffeen, Ill., $192,000, (completed).

New York, New Haven & Hartford

"Other" Main Tracks: New Haven passenger station, 1.01 miles.

Important Work Undertaken: Concrete arch to eliminate grade crossing, 238th street, Woodlawn, N. Y., $731,000 (N.Y. N. H. & H. share, $165,104). (track changes completed, viaduct 20 per cent completed). Viaduct to eliminate grade crossing, 241st street, Woodlawn, N. Y., $693,000 (N. Y. N. H. & H. share, $135,200), (20 per cent completed). Replacing four-track through girder with ballasted deck bridge, Greenwich, Conn., $100,000, (completed).

Construction of two additional tracks for New York, Westchester & Boston, Rye, N. Y., to Port Chester; new station and coach yard, Port Chester, $759,300, (92 per cent completed). Revision of alinement, Guilford, Conn., $160,000, (80 per cent completed).

Reduction of grades, revision of track layout and installation of car retarders, Cedar Hill classification yard, New Haven, Conn., $1,207,200,

(completed). Revision of grades, rearrangement of tracks and installation of car retarders, Northrup avenue yard, Providence, R. I., $500,000, (completed).

Installation of cinder eliminator in power plant, Cos Cob, Conn., $119,500, (40 per cent completed). Installing oil-burning equipment under boilers in power plant, Van Nest, N. Y., $145,000, (completed). Extension to electric repair shop, Van Nest, N. Y., $431,000, (completed). Construction of central heating plant, Harlem River, N. Y., $153,000, (completed).

Reconstruction of station destroyed by fire, Back Bay, Boston, Mass., $971,200, (completed). Construction of passenger platform, station tracks and electrification of tracks, New Haven, Conn., $144,000, (completed). Additions and alterations to freight houses for use as fruit terminal, Boston, Mass., $650,000, (completed). Local freight facilities, Roxbury, Mass., $105,000, (completed). Automobile unloading platform and storage building, Roxbury, Mass., $130,000, (completed). Installation of telephone and block circuits on Danbury, New York and Old Colony divisions, $259,041, (completed).

(Boston Terminal Company). Replacing trainshed with individual butterfly type platform sheds, $1,529,000, (25 per cent completed).

Norfolk & Western

Important Work Undertaken: Grade crossing elimination, Columbus and Portsmouth, Ohio, $4,800,000 (70 per cent completed).

Bridge extensions and improvements at various points, $310,000, (completed). Bridge improvements at various points, $300,000, (started). Extension of eight stalls in enginehouse, Bluefield, W. Va., (completed). Construction of three warehouses, Lambert Point, Va., $260,000, (started). Construction of high tension line, Cowan, W. Va., to Bluefield, $150,000, (25 per cent completed).

(Big Sandy & Cumberland). Reconstruction of 25 miles of narrow gage line to standard gage, Devon, W. Va., to Hurley, and from Grundy, W. Va., down Levisa river; also construction of standard gage cut-off from Hurley to Levisa river, 14 miles, $8,000,000, (50 per cent completed).

(Guyandot & Tug River). Construction of 10.5 miles new line, Wharncliffe, W. Va., to Gilbert, $3,500,000, (30 per cent completed).

Northern Pacific

Important Work Undertaken: Construction of viaduct, Twenty-first street, Superior, Wis., $112,000, (completed). Relocation of main line through yard, Laurel, Mont., $190,000, (completed). Construction of yard, Hill avenue, Superior, Wis., $177,000, (completed). Power Plant, St. Paul, Minn., (completed). Car shop, Laurel, Mont., (completed) New passenger station, lunch room and station tracks, Mandan, N. D., $143,000, (completed). Channel changes and bridge replacements, Yellowstone division in Montana, $569,000, (50 per cent completed).

Important Work Under Survey: New line Brockway, Mont., to Lewistown, 208 miles. Aloha, Wash., to the Hoh river, 60.5 miles.

Pennsylvania

First Track: Jeffersonville, Ind., 1.94 miles.

Second Track: Jeffersonville, Ind., 0.30 miles. Jamieson Road, New York, southward, 0.76 mile. South Wales, N. Y., to Holland, 6.40 miles. Oleon, N. Y., southward, 1.17 miles. Whitehouse, N. Y., Northerly, 0.96 mile.

Important Work Undertaken: Elimination of grade crossings, Brooklawn, N. J. to Woodbury, $375,000 (completed). Track elevation Twenty-fifth Street, South Philadelphia, Pa., $5,575,000 (completed). Reconstruction of overhead bridge, Paxton Street, Harrisburg, Pa., $360,000 (20 per cent completed). Widening Market Street subway, Harrisburg, $880,000 (completed). Undergrade bridge, City Boulevard, Johnstown, Pa., $125,000 (30 per cent completed). Reconstruction of overhead street bridges, Pittsburgh, Pa., $120,000 (completed). Undergrade bridge, Salem, Ohio, $105,000 (completed). Elimination of Broadway and Henry street crossings, Cleveland, Ohio, $275,000 (50 per cent completed). Overhead bridge, Industry, Pa., $115,000 (completed). Track elevation, Newark, Ohio, $945,000, (50 per cent completed). Grade separation, Anthony boulevard, Fort Wayne, Ind., $200,000 (completed). Track elevation, West Sixty-ninth Street to West Eighty-seventh Street, Chicago, $200,000 (completed). Grade separation, Dix-Toledo highway, Lincoln Park, Mich., $100,000 (completed). Grade Separation, Detroit, Mich., and Dearborn, $295,000 (completed). Overhead bridge, Tullytown, Pa., $140,000 (completed). Undergrade bridge, Kenwood Avenue, Baltimore, Md., $190,000 (30 per cent completed).

New bridge over Allegheny river, Oil City, Pa., $1,390,000 (15 per completed). Reconstruction of bridge 97-21, Gnadenhutten, Ohio, $460,0000 (completed). Revision of alinement and grade and replacement of bridge over East Fork of White river, Columbus, Ind., $160,000 (completed). Replacing bridges over Hackensack river, Marion, N. J., $4,355,000 (50 per cent completed). Renewing bridge over Newark bay, Greenville, N. J., $4,175,000 (completed). Arsenal bridge to Broad Street coal handling facilities, South Philadelphia, Pa., $5,560,000 (completed).

Electrification, Philadelphia, Pa., to Trenton, N. J., $7,500,000 (30 per cent completed). Electrification, Philadelphia to Norristown, Pa., $2,765,000 (8 per cent completed).

Yard and enginehouse, Benwood, W. Va., $220,000 (completed). Additions and improvements to engine terminal and mechanical department facilities, Indianapolis, Ind., $450,000 (completed). Installing heavier turntable, Rose Lake, Ill., $145,000 (completed).

Warehouse and pier terminal, Jersey City, N. J., $8,260,000 (20 per cent completed). Reconstruction of bulkheads, Pier 30, $250,000 (completed). Traveling marine leg on grain elevator dock, Erie, Pa., $250,000 (completed). Strengthening new dock wall for river straightening, Chicago, $175,000 (40 per cent completed). Freight station, Trenton, N. J., $1,170,000 (completed). Freight and produce terminal, Pittsburgh, Pa., $3,275,000 (90 per cent completed). Six-story extension to freight house, Harrisburg, Pa., $125,000 (30 per cent completed). Combination seven-story freight station and warehouse, Philadelphia, Pa., $3,006,000 (completed). Offices and additional facilities, Polk Street freight terminal, Chicago, $140,000 (completed). Produce terminal, Ft. Wayne, Ind., $165,000 (completed). Additional freight facilities, Chester, Pa., $115,000 (completed).

Connection to Eighth Avenue subway. Pennsylvania station, New York, $195,000 (completed). Enclosure to exit concourse, construction of shop and trainmen's quarters, exit concourse and parcel room. Pennsylvania station, New York, $575,000 (completed). Enlarged facilities, Journal Square station, Jersey City, N. J., $1,120,000 (completed). Extension of passenger facilities and construction of lift bridge over Passaic River, Newark, N. J., $15,000,000 (2 per cent completed). New passenger station, Lancaster, Pa., $1,290,000 (completed). Passenger station, Fifth Avenue, Gary, Ind., $115,000 (completed). Relocation of main passenger terminals and suburban facilities, Philadelphia, Pa., $50,000,000 (25 per cent completed). Central power plant for new terminal development. Philadelphia, $4,000,000 (completed). Office building above new suburban station, Philadelphia, $6,000,000 (70 per cent completed). Construction of steam and electric power lines, Chicago Union Station, $100,000 (80 per cent completed). Extension of passenger platforms, Overbrook, Pa., to Paoli, $100,000 (completed).

Extension of Grogan yard, Columbus, Ohio, $1,790,000 (completed). Extension of 10 receiving tracks, Grogan yard, and overhead bridge to serve Norfolk & Western, $450,000 (completed). Interchange facilities with Illinois Terminal, St. Jacob, Ill., to Collinsville, $400,000 (completed). Additions to and rearrangement of tracks, Waverly yard, Newark, N. J., $175,000 (90 per cent completed). Revisions and additions to Meadows yard, Kearny, N. J., $715,000 (10 per cent completed). Track changes east and west of Union depot, Columbus, Ohio, $340,000 (completed). New classification yard, plate fulcrum scale, and new passenger station, Jeffersonville, Ind., $280,000 (completed). Double-track hump, West Philadelphia yard, Philadelphia, Pa., $300,000 (completed). Additional yard tracks, Wissahickon avenue to Abbottsford avenue, Philadelphia, $115,000 (completed). Installation of car retarders Pitcairn, Pa., $600,000 (completed). Addition to yard, Shire Oaks, Pa., $185,000 (completed).

Relocation of Wheeling branch, Short Creek, W. Va., to Warwood, $105,000 (completed). New produce stores, Washington, D. C. $605,000 (completed). Improvement of drainage, New York division, $285,000 (95 per cent completed). Improvements to drainage, Trenton branch, $435,000 (60 per cent completed). Improvements to drainage, Philadelphia, Pa., to Washington, D. C., $985,000 (completed). Construction of coal dock, water facilities and combination passenger and freight station, Red Bank, Pa., $110,000 (completed). Construction of passing sidings, Williamsport, Pa., to Elmira, N. Y., $205,000 (completed).

Pere Marquette

Second Track: Michigan avenue, Detroit, Mich., to Dearborn, 0.92 mile.

Important Work Undertaken: Union produce terminal, Detroit, Mich., $5,000,000 (completed).

Pittsburgh & West Virginia

Important Work Undertaken: Construction of new line Pierce, Pa., to Pricedale, 18 miles, (70 per cent completed).

Pittsburgh, Chartiers & Youghiogheny

Important Work Undertaken: Line under construction, Van Emman, Pa., to Eighty-four, 8.36 miles, (work deferred temporarily).

Port Everglades Terminal

Important Work Undertaken: New lines under construction, Municipal Piers, Port Everglades, Fla., southwesterly, 4.5 miles.

Reading

First Track: Line extensions various points in Pennsylvania, 1.03 miles. Extension, Wilmington, Del., 0.01 mile.

Second Track: Various points in Pennsylvania, 1.13 miles.

Important Work Undertaken: Elimination of grade crossings, Manayunk, Pa., $4,500,000 (60 per cent completed). Elimination of grade crossings, Glenside, Pa., $323,000 (completed). Abolition of grade crossings, Emaus, Pa., to Macungie, $218,000 (completed). Elimination of two grade crossings, Reading, Pa., $500,000 (started). Elimination of grade crossing, 61st street, Philadelphia, Pa., $245,000, (completed). Elimination of grade crossing, Fifth street, Reading, Pa., $270,800 (completed). Elimination of grade crossings, Bridgeport, Pa., $300,000 (completed). Elimination of grade crossing, Crescent boulevard, West Collingswood, Pa., $140,000 (50 per cent completed). Elimination of grade crossing, Barley Mill road, Greenville, Pa., $122,000 (completed). Elimination of two grade crossings, St. Clair, Pa., $120,000 (40 per cent completed).

Reconstructing bridge 185-96 over Susquehanna river, Muncy, Pa., $1,015,000 (85 per cent completed). Replacing highway bridge over tracks, Wyomissing, Pa., $148,000 (completed). Replacing bridges at Charlotte and Washington streets, Pottstown, Pa., $117,000 (started). Rebuilding highway bridge over tracks, Tuckertown, Pa., $275,000 (40 per cent completed). Reconstruction of highway bridge over tracks, Ft. Washington, Pa., $116,000 (started). Reconstruction of bridge 200-78, Williamsport, Pa., $150,000 (started). Reconstruction of bridge and pedestrian tunnel Noble, Pa., $120,000 (work started).

Electrification of Philadelphia suburban lines, $20,000,000, including the following: Abolition of grade crossings on Chestnut Hill, $5,700,000 (started); foundation for catenary structures, $325,000 (50 per cent completed); electric car shop and equipment and yard tracks, $600,000 (15 per cent completed). Depressing tracks Broad street to Allegheny avenue, Philadelphia, $175,000 (completed).

New passenger station, Broad street, Philadelphia, $1,700,000 (completed). New passenger station, Pottstown, Pa., $200,000 (completed). New passenger station, Trenton Junction, N. J., $130,000 (50 per cent completed). New passenger station, Franklin street, Reading, Pa., $116,000 (90 per cent completed). Concrete platforms and platform shelters, Franklin street passenger station, Reading, $100,000 (completed).

Extension and remodeling of freight house No. 3, Philadelphia, $100,000 (completed). Construction of 12-story terminal commerce building, $3,000,000 (50 per cent completed). Construction of three-story storehouse, Reading, $750,000 (65 per cent completed). Construction of coal yard, Germantown, Pa., $103,000 (completed). Construction of reservoirs and other water facilities, Beaver Creek, Pa., $170,000 (completed).

Richmond, Fredericksburg & Potomac

Important Work Undertaken: Revision of line and new bridge over Powell's creek, Cherry Valley, Va., $700,000 (completed). Extension of southbound receiving yard, Potomac Yard, Va., $125,000 (50 per cent completed). Installing car retarders and plate fulcrum track scale, Potomac Yard, $550,000 (60 per cent completed).

St. Louis-San Francisco

Second Track: Harvard, Ark., to Clarkdale, 5.05 miles.

Important Work Undertaken: Extension to enginehouse and additional mechanical department facilities, Lindenwood yard, St. Louis, Mo., $261,000 (completed). New freight station and tracks, Oklahoma City, Okla., $340,000 (completed).

St. Louis Southwestern

First Track: Malden, Mo., to Leachville, Ark., 36.05 miles.

Important Work Undertaken: Construction of new line Hornersville, Mo., to Leachville, Ark., 11.38 miles, $390,500 (completed). Recon-

struction of Gulf & North Island Main line, 2.64 miles and construct new line, Malden, Mo., to Deering, 24.67 miles, $851,000 (completed). Revision of grades, Mt. Pleasant, Tex., to Tyler, $2,072,000 (completed). Revision of grades, Tyler, Tex., to Corsicana, $3,095,000 (75 per cent completed). Construction of new yard, Tyler, Tex., $472,000 (completed).

San Diego & Gulf

First Track: Palangana, Tex., 3.75 miles, $50,000.

Seaboard Air Line

Important Work Undertaken: (Prince George & Chesterfield). Construction of new line, Bellwood, Va., to Hopewell, 18 miles, $1,000,000 (98 per cent completed).

Southern Railway System

Important Work Undertaken: Fourth street underpass, Louisville, Ky., $120,000 (completed). Construction of second main track Williamstown., Ky., to Danville, $13,000,000. Grade crossing elimination, Greensboro, N. C., $923,000. Grade crossing elimination, Birmingham, Ala., $738,000. Constructing Third street underpass, Louisville, Ky., $255,000. Construction of coaling station at Inman yard, Atlanta, Ga., $174,000.

Southern Pacific System

First Track: Alturas, Cal., to Klamath Falls, Ore., 95.43 miles. Knights Lodge Jct., Cal., to Boyer, 13.85 miles. Walnut Grove, Cal., to Isleton, 8.56 miles.

Second Main Track: Loganville, Cal., to Watsonville Junction, 7.72 miles. Lick, Cal., to Pomar, 4.17 miles. Perth, Nev., to Oreana, 17.82 miles. Promontary Point, Utah, to Little Mountain,, 9.94 miles.

Third Track: Los Angeles, Cal., 1.63 miles.

Fourth Track: Los Angeles, Cal., 1.62 miles.

Important Work Undertaken: (Pacific lines) Revision of alinement, Reuben Creek, Ore., 2.25 miles, and rip rap protection along stream (85 per cent completed). Construct double-track bridge across Suisun bay, Porta Costa, Cal., (25 per cent completed). Extension to yard, Klamath Falls, Ore. (completed). Construction of 8.1 miles additional yard tracks and build car repair facilities, Fresno, Cal., (completed). Construction of siding between Colin, Utah, and Saline, (completed). Construction of approaches to Suisun bay bridge, 3.3 miles. Construction of new line, Kerman, Cal., to Biola, 5.84 miles. Construction of 18-stall enginehouse, machine shop, power plant, storehouse, oil storage, car repair and other facilities, Taylor, Cal., (25 per cent completed). Construction of new passenger station, Stockton, Cal., (10 per cent completed). Additional water facilities, including 85,356 ft. of pipe line, Montello, Nev., (60 per cent completed). Additional water facilities, including 53,600-ft. of pipe line, Coyote, N. M., to Ancho, (completed).

(Texas and Louisiana lines) Replacing timber trestles and raising grade, Barkwell, Tex., $144,610 (15 per cent completed). Replace open-deck trestle with ballast deck structure, Kurth, Tex., $101,698 (completed). Elimination of grade crossing with Kansas City Southern, Shreveport, La., $335,684 (completed). Replace draw span, bridge 5-A, Houston, Tex., with heavier span, $112,300 (20 per cent completed). Revision of grades, Beaumont division, $210,900 (10 per cent completed). Extension to yard and construction of automobile unloading platform, San Antonio, Tex., $114,686 (80 per cent completed). Construction of engine terminal facilities, Jacksonville, Tex., $183,435 (completed). New passenger station, Del Rio, Tex., $100,017 (completed). Installation of water treatment at 19 water stations in Texas, $183,834 (15 per cent completed). Construction of branch line to Ashland refinery, 7.0 miles.

Terminal Railroad Association of St. Louis

Important Work Undertaken: Construction of express building and house tracks, St. Louis, Mo., $1,000,000 (completed). Extension of train shed and construction of 10 station trains, Union Station, St. Louis, $3,000,000 (completed).

Texas & Pacific

First Track: (Texas-New Mexico Railway) Kermit to Texas-New Mexico State line 10.6 miles.

Second Track: McColl, La., to Addis, 22 miles.

Important Work Undertaken: Underpass, Ft. Worth, Tex., $110,000 (10 per cent completed). Replace two piers and construct additional span over Old river, Torras, La., $325,000 (10 per cent completed). Reconstruction of Atchafalaya river bridge, Melville, La., $2,000,000 (completed). Grade crossing separation, Big Spring, Tex., $250,000 (completed).

Reduction of west bound grade, Sherman Jct., Tex., $100,000 (completed). Grade revision, Ft. Worth, Tex., $300,000 (completed). Classification yard, engine house and other facilities, Relay terminal, Macks, Tex., $500,000 (completed). Extension to yard, Bonham, Tex., $130,000 (20 per cent completed). Engine terminal and shop buildings, Big Spring, Tex., $610,000 (10 per cent completed). Reservoir and other water facilities, Weatherford, Tex., $100,000 (completed). Construction of second track, Dallas, Tex., to Nussbaumer, 11.5 miles.

(Texas-New Mexico Railway) new line surveyed, Texas-New Mexico state line to Lovington, N. M., 78 miles.

Texas Pacific-Missouri Pacific Terminal Railroad of New Orleans

Second Track: Marrero, La., to Westwego, 1.08 miles.

Toledo Terminal Railroad

Important Work Undertaken: Replacing Maumee river bridge with double track structure, Toledo, Ohio, $1,330,000 (85 per cent completed).

Union Pacific System

First Track: Extension of Park City branch, Utah, 5.23 miles. Extension of Grass Creek branch, Utah, 0.44 mile.

Important Work Undertaken: Extension and rearrangement of yard and diverting channel of Bitter Creek, Green River, Wyo., $267,000 (completed). Extension to general office, Omaha, Neb., $498,000 (completed). New freight house, Hastings, Neb., $145,000 (completed). Construction of passenger station office and tracks, Gering, Neb., $124,000 (completed). New passenger station, Marysville, Kan., $138,000 (completed), New passenger station and tracks, Abilene, Kan., $149,000 (completed). New Union passenger station, Omaha, Neb., $3,400,000, (30 per cent completed). Grade crossing elimination, Laramie, Wyo., $170,000 (completed). Grade crossing elimination, Cheyenne, Wyo., $262,000 (completed). Addition and improvements to engine house, Cheyenne, Wyo., $300,000 (completed). Remodeling and improvements to tie treating plant, Laramie, Wyo., $180,000 (completed).

(Oregon Short Line). Extension to power house and additional power plant equipment, Pocatello, Idaho, $165,000 (65 per cent completed).

(Oregon-Washington Railroad & Navigation Company). Construction of twin tunnel and lining old tunnel, Weatherby, Ore., $135,000 (completed). New station and office, La Grande, Ore., $128,500 (started).

(Los Angeles & Salt Lake). Elimination of Ninth street grade crossing, Los Angeles, Cal., $238,000 (5 per cent completed). Construction of viaduct over Los Angeles river at First Street, Los Angeles (joint with Atchison, Topeka & Santa Fe and city), $1,616,000 (L. A. & S. L. proportion, $257,000) (completed). Grade crossing separation, Wineville, Cal., $165,000 (20 per cent completed). Construction of double track bridge, Pico, Cal., $226,000 (completed). Reconstruction of bridge 9-04 over Rio Honde Montebello, Cal., $377,000 (completed). Industrial tracks to serve Ford Motor Company, Wilmington, Cal., $431,000 (completed). Enlargement to standard double track section and lining with concrete the following tunnels: No. 7, near Stine, Nev., $183,000 (completed). No. 8, near Stine, Neb., $100,000 (completed). No. 9, near Etna, Neb., $250,000 (completed). New passenger station, East Los Angeles, Cal., $100,000 (completed). Additional freight house, Los Angeles, $288,000 (5 per cent completed). Construction of 2,500,000 concrete reservoir and lay 9,000 ft. of pipe line, Las Vegas, Nev., $143,000 (completed).

Virginian

First Track: Itman, W. Va., to M. P. 19.0, 16.55 miles.

Important Work Undertaken: New line, Itman branch, 7 miles, M. P. 19 to M. P. 26. Replacing five timber trestles with permanent structures, $160,000 (completed).

Important Work Projected: New line under survey, M. P. 26 to Gilbert, W. Va., 17 miles.

Wabash

Important Work Undertaken: Separation of grades, Russell and Hastings streets, Detroit, Mich., $104,000 (completed). Grade separation, Southfield road, Detroit, $268,500 (completed). Grade separation, Western avenue, Chicago, $352,700 (80 per cent completed). Elimination of grade crossing, Brush College road, Decatur, Ill., $233,000 (50 per cent completed). Elimination of West Fort street grade crossing, Detroit, Mich., $148,800 (completed). Replacement of bridge No. 747, Danville, Ill., $462,190 (93 per cent completed). Additional yard tracks, Decatur, Ill., $445,500 (completed). Addition to classification yard, Oakwood, Mich., $190,700 (completed). Construction of new yard, Detroit, Mich., $300,000 (completed). Construction of new freight warehouse, Trombley avenue, Detroit, $203,000 (completed). Grade revision, Miami, Mo., $104,900 (completed). Construction of office building, Detroit, Mich., $266,000 (completed). Construction of passenger station, Delmar avenue, St. Louis, Mo., $323,200 (completed). Construction of Rialto elevator, Chicago, $142,200 (completed).

Waco, Beaumont, Trinity & Sabine

Important Work Undertaken: New lines under construction: Weldon, Tex., to Waco, 109 miles, and Livingstone, Tex., to Port Arthur, 100 miles. (work deferred temporarily).

Western Pacific

First Track: (Sacramento Northern) Riverview, Cal., to Westfield. 15.8 miles.

Important Work Undertaken: New line, Harte, Cal., to Disappointment Slough, 2.85 miles. Construction of new passing siding, Fitz, Cal., and extensions to passing sidings at Pulga, Cal., and Belden, $155,000 (completed). Replacing four timber bridges in Nevada and Utah with permanent structure, $104,000 (completed).

Important Work Projected: Lines under survey: Keddie, Cal., to Beiber, 111.6 miles. San Francisco, Cal., to Niles, 39.0 miles. Nile Gardens, Cal., to Kings River, via Fresno, 123.7 miles.

(Sacramento Northern). Vaca Valley, construction of connection to Vacaville-Suisun line, Cal., 7.5 miles. Extension of Pittsburg branch, Pittsburg, Cal., 8.88 miles.

Railway Construction in Canada

Algoma Central & Hudson Bay

Important Work Undertaken: Storage coal dock and steam-operated coal bridge, Michipicotin, Ont., $450,000 (completed).

Algoma Eastern

Important Work Undertaken: Extension to coal dock and coal bridge, Turner, Ont., $250,000 (completed).

Canadian National

First Track: Grand Mere, P. Q., to East Burrills, 7.90 miles. Garson spur extension, Ont., 3.52 miles. Sherritt-Gordon branch, 42 miles. Sturgis-Peesane branch, Sask., 37.06 miles. Peesane, Sask., northerly, 20.29 miles. Shellbrook, Sask., westerly, 35.72 miles. Hudson Bay Junction, Sask., southerly, 16.36 miles. Melford, Sask., to Aberdeen, 89 miles.

(Hudson Bay Railway). Extension to Ft. Churchill, Man., 43.5 miles.

Second Track: Rainey River, Ont., 1.48 miles. Hickey, Man., to South Junction, 12.16 miles. Woodridge, Man., to Baynham, 6.45 miles.

Important Work Undertaken: New lines under construction: Willowbrook, Sask., northwest, 22.44 miles. Turtleford, Sask., southeast, 12.98 miles. Kindersley, Sask., to Glidden, 15.95 miles. Spruce Lake, Sask., westerly, 3.87 miles. Mawer, Sask., southwesterly, 18.5 miles. Neidpath, Sask., to Swift Current, 26.9 miles. Unity, Sask., southwesterly, 32.5 miles. Hamlin, Sask., to Glenbush, 12.2 miles. Elk Point, Alta., easterly, 7.80 miles. Hemaruka, Alta., to Scapa, 41 miles. St. Walburg, Alta., to Bonnyville, 26.4 miles.

(Hudson Bay Railway). Extension to Ft. Churchill, 50 miles.

Industrial spur to Chrysler Motor Company's plant, Walkerville, Ont., 3.5 miles (completed). Track connections to Kingston elevator, Kingston, Ont., (to be completed in 1930). Construction of double track, 12.04 miles, Port Arthur division, and erect 40,000 gal. water tank (completed). Revision of alinement and construction of double track, Chappell, Sask., to Craik Junction, and revise terminal facilities South Saskatoon, Nutana and Chappell (completed). Standardize gage, Murray Harbor and Vernon subdivisions, P. E. I.

Construction of six yard tracks, Tecumseh, Ont., (completed). Connecting track to elevator, Sorel, Que., (completed). New yard and terminal facilities, Sarnia, Ont. Rearrangement of yard, construction of passenger platforms, air, water and gas lines and ice house, freight house driveways, Saskatoon, Sask. (completed). Enlargement of Turcot yard, Montreal, Que. Filling False creek for future terminal facilities, Vancouver, B. C.

Track elevation along water front, Toronto, Ont., (to be completed in 1931). Vehicular subway, west end Victoria bridge, Montreal, Que., (completed).

Renewal and strengthening floor system of International bridge (completed). Replacing timber trestle and Howe truss bridge, mile 87.1, Avonlea, Sask. (to be completed 1930). Line revision and construction of lift span and steel trestle approaches to eliminate timber trestle, Sumas river, Kamloops division (to be completed 1930). Filling bridges and replacing timber structures with permanent bridges, Brazeau subdivision, Calgary division (completed). Replacing timber trestle with steel viaduct, 1,520 ft. long, Minnewashta creek, Melville division (completed). Construction of culvert and filling timber trestle 1,784 ft. long, Saskatoon division (to be completed 1930). Replacing of timber trestle approaches with embankment, Pembina river bridge, Edson division (completed).

New shops and power house, Point St. Charles, Montreal, Que. (completed). Ten-stall addition to enginehouse, Edmonton, Alta. (completed). New baggage and express building, St. John, N. B. (completed). Construction of hotel and station, Halifax, N. S. Construction of hotel, Charlottetown, P. E. I. Construction of station and passenger terminals, Hamilton, Ont. Extension to Chateau Laurier, Ottawa, Ont. Construction of warehouse, North Bay, Ont. (completed). Construction of hotel, Saskatoon, Sask. Construction of 500-room hotel, Vancouver, B. C. Improvements and additions to hotel and staff buildings, Jasper Park Lodge, Alta. Construction of passenger station, Saskatoon, Alta. Construction of new fruit facilities, temporary express facilities and warehouse, Bonaventure station area, and extend passenger tracks and platforms, Montreal, Que.

Renew superstructure, ferry slip transfers, Point Tupper and Mulgrave. Construction of sea wall and grading for rearrangement of terminal facilities, Charlottetown, P. E. I. Extension and improvements to dock at Vancouver, B. C.

Construction of dam, reservoir, pipe line and other water facilities, Dobson, Alta. (completed).

Canadian Pacific

First Track: Sudbury Basin branch, Sudbury, Ont., 5.9 miles (completed). Acme, Alta., northwesterly, 28 miles (completed). Aikens, Sask., northerly, 20.5 miles (completed). Archive, Sask., to Wymark, 38 miles (12 miles completed). Bromhead, Sask., westerly 18.5 miles (completed). Fife Lake, Sask., 19.4 miles (completed). Hatton, Alta., northeasterly, 17.8 miles (completed). Kootenay Landing, B. C., 34 miles (10 miles of grading completed). Lanigan, Sask., to Prince Albert, 93.6 miles (completed). Leader, Sask., southeasterly, 25 miles (completed). Lloydminster, Sask., northeasterly, 25 miles (completed). Langdon, Alta., northerly and easterly from Rosedale, 37.8 miles (completed). Moose Jaw, Sask., southwesterly, 36.5 miles (completed). Rosetown, Sask., to Perdue, 44.8 miles (completed). Suffield, Alta., to Blackie, 22.8 miles (5.8 miles completed). Willingdon, Alta., to Vegreville, 25.0 miles (completed). Willingdon, Alta., to Strathcona, 67.2 miles (completed). Coronation, Alta., to Youngstown, 42 miles (8.5 miles completed). Tuffnell, Sask., to Prince Albert, 25 miles (18 miles graded). Unwin, Sask., westerly, 19.5 miles (completed). Woolford, Alta., southeasterly, 13 miles (completed).

(Lacombe & Northwestern). Alta., 22 miles (completed).

Important Work Undertaken: Extension of terminal facilities, Quebec, P. Q., $1,300,000 (10 per cent completed). Terminal improvements, Toronto, Ont., $4,000,000 (50 per cent completed). Office building, Toronto, $370,000 (20 per cent completed). New hotel, Digby, N. S., $490,000 (completed). Alterations and additions to Algonquin hotel, St. Andrews, N. B., $160,000 (completed). Royal York hotel, Toronto, $15,000,000 (completed). New hotel, Regina, Sask., $110,000 (completed). Addition to Palliser hotel, Calgary, Alta., $1,700,000 (completed). Addition to Empress hotel, Victoria, B. C., $2,600,000 (completed).

Toronto, Hamilton & Buffalo

Important Work Undertaken: Grading for double track and construction of subway, Stony Creek, Ont., to Lees Mountain road, $272,000 (98.5 completed). Rock excavation East Mountain, Stony Creek, Ont., (completed). Construction of engine terminal, Hamilton, Ont., $1,250,000 (90 per cent completed). North coal dock and yard, Port Maitland, Ont., $249,000 (completed).

Toronto Terminal Railway

Important Work Undertaken: Canadian Express building and office, Toronto, Ont., $774,000 (completed). Central heating plant, Toronto, $354,000 (completed). Canadian Pacific Express office and warehouse, Toronto, $300,000 (completed). Construction of trainshed, Toronto Union station, $300,000 (completed).

Railway Construction in Mexico

Great Pacific of Mexico

Important Work Projected: Ejutla, Oax., to Puerto Angel, 75 miles. Pochutta, Oax, to Salina Cruz, 93 miles. Puerto Angel to Acapulco, Gro., 249 miles. Acapulco, Gro., to Uruapan, Micho., 267 miles. La Balsas, Gro., to Balsas, 218 miles.

National Railway of Mexico

First Track: Between Agua Buena and Presa Molino de Caballeros. Aguilera Km. P. 105 to San Francisco del Oro. Kilometer B-516 to Villa de Fozos.

Important Work Undertaken: New lines under construction: Mexico-Tampico short line, 333.37 miles, (40 miles, 13.8 per cent completed). Gulf Coast line, Tampico to Vera Cruz, 312.8 miles (40 miles, 14.7 per cent completed). Line from Calles to Guerrero, 78.42 miles, (80.5 per cent completed, 32 miles in operation). Construction of locomotive and car repair shops, Monterey, N. L. (70 per cent completed).

Important Work Projected: New lines authorized: Empalme de el Oro to Sierra Mojada. San Carlos to Villa Acuña. El Salto to Mazatlan (Durango to Mazatlan extension).

Lines under survey: Soledad to Puerto de Tuxpan (surveys completed). Uruapan and Apazingan to Zihuatanejo.

New lines projected: Sierra Mojada to Jimenez. Zacatecas and Berriozabal to La Honda. Rosario to Inde. Inde to Descubridora. Inde to Tepehaunes. Tepehuanes to Guanacevi. Puerto Mexico and Santa Lucrecia to Campeche. Balsas to Acapulco. Tahuacan and Tesonapa to Rio Blanca. Balsas to Zihuatanejo. Coapa to Cayuca. Ejutla to Peurto Angelo, .75 miles. Tlacolula to Tehuantepec.

* * * *

Two Types of Motive Power on the Swiss Federal Railways

Railway Finances in 1929

Railway stocks decline less than industrials in market drop—
Stock prices out of line with dividends

By James G. Lyne
Financial Editor, *Railway Age*

THE past year has, as everyone knows, been one of violent action—and reaction—in the stock market. The *Railway Age* average price of twenty leading railroad stocks began the year at a modest 131 and there it remained, with minor fluctuations up and down, during the first five months of the year. Then, in June, began a steady crescendo which continued unabated until the fourth week in July, when the average reached 156. A slight recession then occurred and lasted for two or three weeks; then, once again, the average mounted rapidly, attaining the pinnacle of 164 the first week in September.

Then came a definite recession for several weeks, October 22 finding the average at 151. Then followed the deluge—the average fell 23 points, to 127, in one week. Just one week later, November 12, the average had fallen to 117, the low point for the year. Recovery then set in and the prospect is that the average at the end of the year will approximate that at the beginning, i.e., something in the neighborhood of 130.

A comparison between the behavior of railroad stocks and those of industrial concerns may be had by reference to the Wall Street Journal's tabulation of average prices of representative shares of both classifications of industry. The Journal's railroad average, which is compiled on a different basis than that of the *Railway Age*, commenced the year at 153. It reached its summit, 189, early in September and its low point, 128, about the middle of November. The Journal's average of industrial shares began the year at 307, reached the peak, 381, early in September and the bottom of the decline, 199, in November. Railroad stocks, according to the Wall Street Journal's average, as the year drew to a close were tending to linger at about the same figure with which they began the year. Prices of industrial stocks, on the other hand, at the beginning of the second week in December averaged about 12 per cent lower than they did at the beginning of the year.

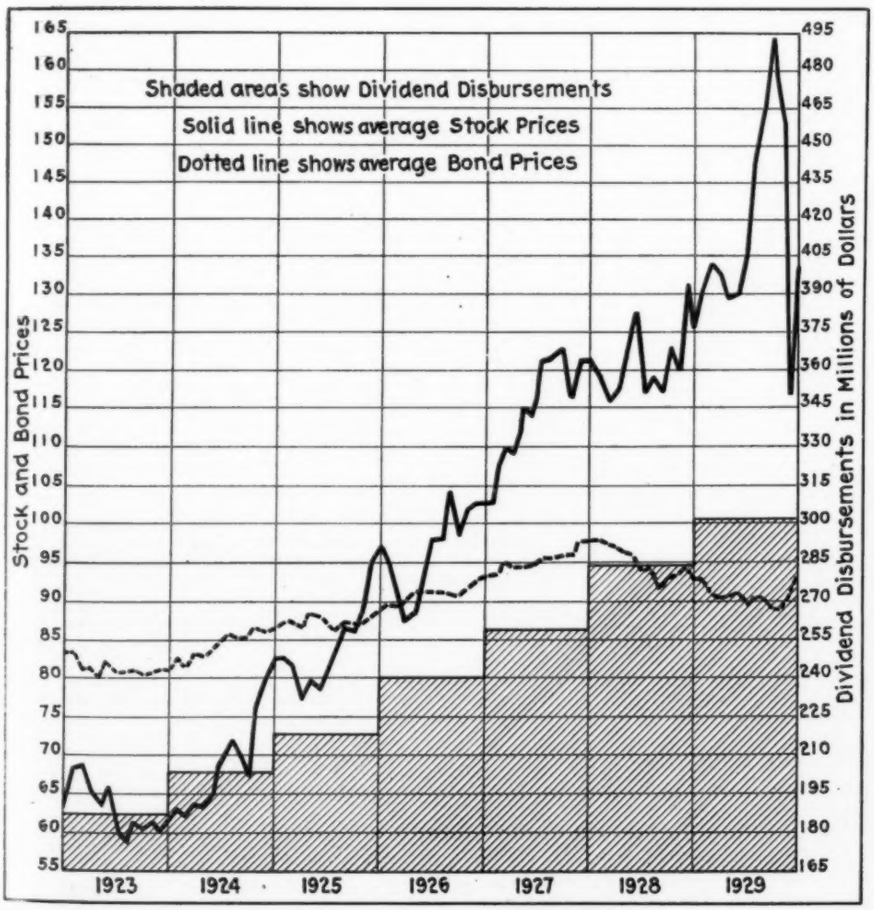


Chart A—Average Prices of Stocks and Bonds of Twenty Leading Railroads, with Dividend Disbursement Changes Shown on Same Relative Scale
1929 Dividend Payments Estimated.

From the Wall Street Journal averages, it appears that a purchaser of railroad stocks at the beginning of the year who was fortunate enough to sell them when they reached their peak would have realized a profit of 23 per cent. If he had sold them at the low point, his loss would have been 16 per cent. If he had continued to hold them, he would have neither gained nor lost anything.

On the other hand, the investor in industrial stocks at the beginning of the year would have gained 24 per cent if he had sold at the peak, lost 35 per cent if he had sold at the lowest point, and would still face a paper loss of 15 cent if he had held his securities. Losses by purchase at the peak and sale at the low would have been 42 per cent for industrial stocks as compared with 32 per cent for railroad stocks.

These somewhat theoretical comparisons serve to strengthen the observation heretofore

made that investment in railroad stocks, if it does not offer quite the opportunities for profit that investment in industrial shares does, nevertheless has a somewhat slighter hazard of loss.

Railroad bonds, as could be expected in a year characterized by intense interest in advancing stock prices, were not particularly attractive to investors. Prices

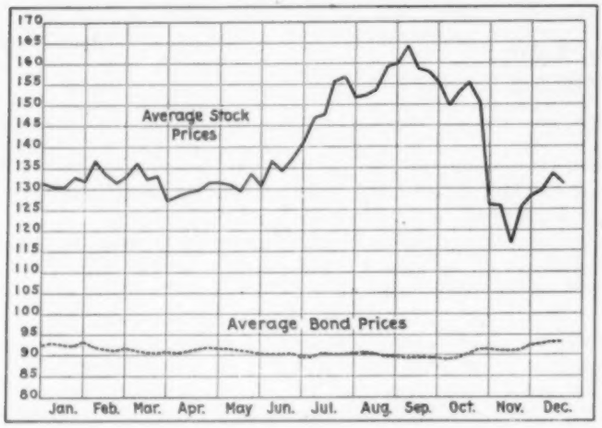


Chart B—Fluctuations in Average Price of Twenty Leading Railway Stocks and Twenty Leading Railway Bonds in 1929

lagged, the *Railway Age* average of twenty representative issues remaining below 90 for a period of eight consecutive weeks in August, September and October, right at the time when stock prices were at their highest. When, finally, however, stock prices started to fall, interest in bonds began to quicken. By the second week in December prices reached an average of 93, somewhat higher than the price of the first week in January.

The fluctuations in the average price of 20 leading issues of stocks and 20 of bonds during the year are shown in Chart B. Chart A shows similar fluctuations since 1923. In addition, this latter chart shows total dividend disbursements on the stocks of these twenty railroads portrayed on a scale comparable to that upon which the stock price curve is drawn. In preparing this chart, dividend disbursements in 1923 were correlated with average stock prices. Following years have seen this correlation disappear, since increased dividends, shown on a proportionate scale, remained far below stock market prices.

It cannot be assumed, of course, that the relationship of stock prices to dividends in 1923 was ideal, and that it should have been maintained. On the other hand, the widening spread which has appeared between dividend disbursements and stock prices since that time does show that increased payments have not been the principal factor in increased stock prices. Comparative prices of railroad stocks, therefore, are not an accurate gage of the profitability of railroad operation. The owners of the twenty railroads in 1928 received only 51 per cent more in dividends than in 1923. Their stocks, however, were worth almost 100 per cent more at stock market prices. To gage railroad prosperity solely by stock prices, therefore, would lead inevitably to overestimation—it is earnings and dividends, not market prices, which are the real gage of profitability.

Table I—Comparison of Dividends and Taxes, 1911 to 1928

Year Ended June 30	Dividends*	Proportion of Net Income Paid in Dividends	Taxes*
1911	$397,068,724	81	$98,626,848
1912	339,964,855	85	109,445,407
1913	322,300,406	66	118,386,859
1914	376,098,785	108	135,572,579
1915	259,809,520	82	133,276,330
1916	281,936,371	47	145,517,034
Year Ended December 31			
1916	306,176,937	47	157,113,372
1917	320,395,779	53	213,920,095
1918	275,336,547	71	223,175,379
1919	278,516,908	62.5	232,601,397
1920	271,731,669	63	272,061,453
1921	298,511,328	95	275,875,990
1922	271,573,751	73	301,034,923
1923	296,127,048	53	331,915,459
1924	320,429,767	57	340,336,686
1925	342,020,885	49	358,516,046
1926	399,243,963	49	388,922,856
1927	411,581,093	61	376,110,250
1928	431,030,910	55	389,432,415

* Not including switching and terminal companies.

Dividend Changes

There were a considerable number of dividend increases in 1929, and only one, rather unimportant, downward revision. Among the railroads which revised upward the annual rate on their common were the Baltimore & Ohio, the Chicago & North Western, the Chicago, Rock Island & Pacific, the Louisville, Henderson and St. Louis, the New York, New Haven & Hartford, the Pennsylvania and the St. Louis-San Francisco.

The Boston & Maine paid off the arrearages of interest on its unstamped cumulative first preferred stock, resumed regular dividends on its non-cumulative preferred and announced that it could have paid common dividends, had it not been desirous of proceeding first a little further with its rehabilitation out of income. The Erie resumed regular 4 per cent dividends on its preferred stock. The Michigan Central paid an extra dividend of 100 per cent in cash. The Kansas City Southern paid an initial dividend on a 5 per cent per annum basis on its common stock. Several roads declared extra dividends.

These and other dividend movements are summarized in the partial list of such changes below:

Baltimore & Ohio.—The directors of this company on September 18 voted to raise the annual dividend rate on common stock from six dollars to seven dollars.

Boston & Maine.—In February it was decided to pay off arrearages in interest on first preferred shares which were not stamped under the refinancing plan. The dividends due amounted to from $19.35 on class E shares to $43 on class D. Regular dividends on the 6 per cent non-cumulative preferred stock were resumed by the company on March 13.

Chicago & North Western.—The directors in November announced an increase in the annual dividend rate from $4 to $5 on the common stock.

Chicago, Rock Island & Pacific.—The dividends on this company's common stock were placed on a basis of $7 per annum, being increased from $6, payable to stockholders of record March 8 and thereafter.

Cincinnati, New Orleans & Texas Pacific.—The directors in December voted an extra dividend of 3 per cent on the common stock.

Cincinnati Northern.—A special dividend of $10 per share was paid to stockholders of record April 15.

Erie.—The Erie made its first dividend disbursement since 1907 when, early in July, semi-annual dividends on a $4 per annum basis were declared on both its first and second preferred stock.

Green Bay & Western.—A dividend of 1 per cent was declared on this company's class B debentures at a meeting of the directors in January. The dividend for several years past had been 0.5 per cent.

Kansas City Southern.—An initial dividend on a 5 per cent an-

nual basis was declared on this company's common stock payable to holders of record March 31.

Lehigh Valley.—On December 4 the directors declared an extra dividend of 2 per cent ($1 a share) on the $50-par common stock.

Louisville, Henderson & St. Louis.—A semi-annual dividend of 4 per cent was paid on common stock in August, placing it on an 8 per cent annual basis, in accordance with the provision under which this company is leased to the Louisville & Nashville. The Henderson formerly paid 5 per cent annually.

Michigan Central.—An extra cash dividend of 100 per cent on its common stock, the largest extra dividend the company has ever declared, was announced following a meeting of the directors on March 13.

Midland Valley.—An extra dividend of $1, or 2 per cent on the $50-par common stock of this company, was paid on December 30.

Nashville, Chattanooga & St. Louis.—A stock dividend of $9,600,000—equivalent to 60 per cent on outstanding capital stock—was authorized by the Interstate Commerce Commission in November and distributed pro rata among the stockholders.

New York, New Haven & Hartford.—The dividend rate on the common stock of this company was increased twice during the year—from $4 to $5 per annum in August, and again from $5 to $6 in November.

Norfolk & Western.—An extra dividend of $4 per share on its common stock was declared by the company to the benefit of holders of record of November 20. There was nothing novel about the declaration of an extra dividend by this company in the autumn—several such have been declared. Previously these extra payments have been $2 a share, however, as compared with $4 this year.

Norfolk Southern.—This company, after a no-dividend period of 15 years, on January 3 declared a 1¼ per cent semi-annual dividend and an extra dividend of 1 per cent. In July the semi-annual payment of 1¼ per cent was continued, but the next such dividend, due January 3, 1930, has been passed.

Pennsylvania.—On April 24 the directors raised the quarterly dividend rate on capital stock ($50 par) of this company to $1, making the annual dividend rate 8 per cent.

Peoria & Bureau Valley.—The directors declared a dividend on an 8 per cent per annum basis effective with the January payment, superceding the previous 7 per cent basis.

Piedmont & Northern.—After an interval of three years during which no dividend were paid, the directors of this company in April declared a quarterly dividend of 1¼ per cent on capital stock.

Rutland.—A dividend of 2 per cent on the 7 per cent cumulative preferred stock of this company was paid in October, the last previous payment on this issue being 1 per cent in December, 1928.

St. Louis-San Francisco.—The annual dividend rate on the common stock of this company was raised from $7 to $8 per share with the payment for the first quarter of 1929.

Wabash.—A decision of the United States Circuit Court of Appeals at New York handed down on January 7 held it to be unlawful for this company to pay dividends on stock junior to its class A preferred until arrearages on the class A had been satisfied. Class A preferred is non-cumulative, but it was held that it is entitled to dividends any year when they are earned. It was alleged by complainants that dividends on this stock had been earned in several years, but not paid. The court held that, until dividends for these years were disbursed on Class A stock, no dividends could be paid on shares junior thereto. The company, pursuant to this decision, withdrew a dividend which had been declared on Class B preferred. The regular dividends on class A have been paid since 1925.

1929 Security Issues

The railroads, according to the Wall Street Journal's tabulation, placed $742,655,390 of new securities in the first eleven months of 1929 as compared with $746,724,100 in the same period of 1928. This total was divided as follows: Bonds, $388,984,000; notes, $174,427,000; and stock, $179,244,390. Compared with last year this shows a decline in the issue of stock and bonds and a very great increase in note issues.

The decline in bond issues is readily explained by the relative unattractivness of such securities in the market during most of the year, and their consequent low price. This condition has lead many railroads, desirous of financing through bond issues or equipment trust obligations, to postpone the issue of such securities, financing themselves temporarily out of current funds or the issue of short time notes. The recent increase in the price of fixed income obligations has relieved this situation somewhat and, if the tendency should continue, a considerable volume of new financing might soon develop.

Among the larger issues of new stock in 1929 were those of the Baltimore & Ohio of $41,107,000; the New York Central of $35,000,000; and the Chesapeake & Ohio and the Canadian Pacific of $30,000,000 each. The Baltimore & Ohio and New York Central issues were offered to stockholders and employees at par, involving valuable purchase "rights." The Canadian Pacific stock was also alloted to stockholders at $170, well below the market price. The Chesapeake & Ohio issue was offered at par ($100) following approval by the Interstate Commerce Commission which, in 1928, insisted that the price be set at $150. The Pennsylvania was authorized by the Interstate Commerce Commission to issue $71,836,050 of stock and sell it at par to stockholders of record December 7.

Table II—Partial List of Securities Issued in 1929—Stock

Road	Amount	Terms
Baltimore & Ohio	$41,107,700	Common stock offered to holders of preferred and common stock at $100 per share to extent of 15 per cent of their holdings as of May 1.
Bangor & Aroostook	1,761,000	Common stock sold at not less than $60 (par $50) to reimburse treasury for capital expenditures.
Boston & Maine	7,500,000	Prior preference stock to be offered in exchange for company's mortgage bonds at rate of 5 shares of stock for each $500 bond.
Canadian Pacific	30,000,000	Common stock offered to stockholders of record May 2, 1929, at $170; one new share for each 10 shares held.
Chesapeake & Ohio	30,000,000	Common stock offered to stockholders of record April 30, 1929, at par in proportion of one new share for each four held.
Cincinnati Union Terminal	3,000,000	Preferred stock offered at 105 by Hornblower & Weeks and Aub & Co. Dividends guaranteed by seven railways planning to use new terminal.
Long Island	14,997,750	Capital stock offered to applicant stockholders of record August 31 to extent of 37.5 per cent of holdings.
Nashville, Chatt. & St. Louis	9,600,000	Common stock distributed pro rata among present stockholders as a dividend.
New York Central	35,669,900	Capital stock sold to stockholders of record November 15 at par on basis of one new share for each 13 held.
New York, New Haven & Hartford	964,500	Capital stock of Old Colony sold at auction to highest bidder at not less than par, proceeds used to reimburse N. Y., N. H. & H. for advances.
Pennsylvania	71,836,050	Capital stock offered to existing stockholders pro rata at par.
St. Paul Bridge & Terminal	398,000	Capital stock sold at par to present stockholders.
Seaboard Air Line	1,892,630 shares	No-par common stock offered to stockholders at $12 at ratio of 2 new shares for each share held and to adjustment bondholders at rate of 2 new shares for each share held under readjustment plan.
Southern Pacific	$19,549,800	Common stock offered to stockholders at $145 who purchase new bond issue—three shares of stock for each $1000 bond.
Wichita Falls & Southern	1,500,000	Common stock offered to existing stockholders at par.

Table II—(Continued) Bonds

Bonds

Road	Maturity	Amount	Int. Rate	Sold to Brokers Price	Sold to Brokers Cost %	Offered to Public Price	Offered to Public Yield	Offered by
Atchison, Topeka & Santa Fe, Gen. Mtge...	1987	$3,577,000	4½	98	4.598	...	...	.....
Bellefonte Central, 1st Mtge.....	1949	200,000	6	90	6.944	98.5	6.12	William Marriott Canby, Phila., and Jay N. Schroeder & Co., Inc.
Boston & Maine, Mtg., Series HH.....	1952	2,400,000	5	...	....	98	5.75	Sold to Nathan L. Amster, The Amster Investment & Trading Ass'n, and other holders of unstamped stock at par—$1,500,000 offered publicly by National City Co. at price quoted.
Canadian National	1969	20,000,000	5	...	....	99.75	...	Offered by syndicate of 30 banking houses in Canada and U. S.
Canadian National, Guaranteed	1969	40,000,000	5	...	....	99.75	...	Dominion Securities Corp., Dillon Read & Co., Wood Gundy & Co., A. E. Ames & Co., Bank of Montreal, Royal Bank of Canada, Canadian Bank of Commerce.
Canadian National, Guaranteed	1969	30,000,000	5	...	....	98.5	...	Offered by a syndicate of 30 banking houses in Canada and U. S.
Canadian Pacific	1954	30,000,000	5	...	....	100	...	The National City Co., and nine other Canadian and American banking houses.
Central of Georgia Ref. & Gen. Mtge., Series C	1959	10,000,000	5	95.5	5.3	98.25	5.12	Kuhn Loeb & Co.
Chesapeake & Ohio Ref. & Imp. Mtge., Series A	1993	24,784,000	4½	92.5	....	95	4.74	J. P. Morgan & Co., Kuhn Loeb & Co., First Natl. Bank, Guaranty Co., Natl. City Co.
Chicago & North Western, Conv. Series A..	1949	72,335,000	4¾	...	....	100	4.75	Offered to stockholders of record Sept. 24, 1929, at par and interest in amount equal to 40 per cent of par value of stock held. Issue underwritten by Kuhn Loeb & Co. at 2½ per cent.
Chicago & North Western Gen. Mtge.....	1987	3,577,000	4½	98	4.598	...	...	Kuhn Loeb & Co.
Cincinnati Union Terminal Notes.....	....	5,250,000	6	100	6	...	...	.....
Cleveland, Cincinnati, Chicago & St. Louis, Ref. & Imp. Mtge., Series E.....	1979	24,000,000	4½	90	5.056	...	...	J. P. Morgan & Co.
Galveston Wharf Ref. Mtge., Series B.....	1954	2,245,000	5½	95	5.884	100	5.50	Arthur Perry & Co., Halsey, Stuart & Co.
Kansas, Oklahoma & Gulf First Mtge.....	1978	182,000	5	94	5.346	...	...	.....
Michigan Central Ref. & Imp., Series C....	1979	7,634,00.	4½	96	4.709	...	...	.....
Missouri-Illinois First Mtge.	1959	3,500,000	5	95	5.336	94	5.4	Dillon Read & Co., Harris, Forbes & Co., Spencer Trask & Co., Stone & Webster and Blodgett.
Missouri Pacific Conv.	1949	46,392,000	5½	...	....	97.5	5.71	Offered to preferred and common shareholders to extent of 30 per cent of holdings, Kuhn Loeb & Co. underwriting the issue at a fee of 2½ per cent.
New York, Chicago & St. Louis, Gold Notes	1932	20,000,000	6	98	6.746	100	6	Guaranty Co. of New York, Lee, Higginson & Co., Dillon, Read & Co., Harris Forbes & Co.
Pittsburgh & West Va. First Mtge., Series B	1959	3,000,000	4½	93.5	4.917	94	4.88	Brown Bros. & Co., Stone & Webster & Blodgett.
Railway Express Agency Serial Bonds, Series A	1949	32,000,000	5	97.75	5.307	...	...	J. P. Morgan & Co., Kuhn Loeb & Co., First National Bank, National City Co.
Southern Pacific	1969	65,166,000	4½	...	....	94	4.85	Offered to stockholders together with purchase warrants for common stock, remainder of issue not so disposed of taken by Kuhn Loeb & Co. at a fee of 2½ per cent, making cost to railroad 4.993 per cent.
Tennessee Gen. Mtge.	1944	100,000	6	100	6	...	...	.....
Tennessee Central First Mtge., Series B.....	1947	410,000	6	95	6.475	98.5	6.14	National City Co.
Terminal R. R. Ass'n of St. Louis Gen. Mtge. Ref.	1953	8,000,000	4	87	4.93	89	4.77	J. P. Morgan & Co., First National Bank and National City Co.
Texas & Pacif · Gen. & Ref., Series C.....	1979	20,000,000	5	96.75	....	99.5	...	Kuhn Loeb & Co.
Toledo Termin..!, First Mtge.	1957	500,000	4½	92	5.028	...	...	.....
Western Pacific First Mtge., Series A.....	1946	5,000,000	5	97.5	....	...	...	.....

Equipment Trust Certificates

Issue	Maturity	Amount	Int.	Sold to Bankers Price	Sold to Bankers Cost %	Sold to Public to Yield %	Offered by
Baltimore & Ohio, Series F.....	1930-44	$13,500,000	4½	94.577	5.3879	5.125-6	Bankers Company of New York, Continental Illinois Co., Evans, Stillman & Co.
Boston & Maine, No. 5.....	1930-44	1,710,000	5	98.52	5.24	5.05-6	Brown Bros. & Co., Evans, Stillman & Co.
Canadian National, Series K.....	1930-44	18,000,000	5	....	.....	5.10-5.75	Chase Securities Corp., Blair & Co., Inc., Equitable Trust Co. of N. Y., Wood Gundy & Co., Inc., Bank of Montreal, Royal Bank of Canada, First National Corp. of Boston, Guardian Detroit Co., Marine Trust Co., Buffalo, Freeman & Co.
Canadian Pacific	1929-44	30,000,000	5	....	.....	5.05	National City Co., Guaranty Co. of N. Y., Bank of Montreal, Royal Bank of Canada, Wood Gundy & Co., Inc.
Central Vermont, Issue of 1929.....	1930-44	1,849,000	5	.....	.....	.....	To be used as security for temporary financing at a cost to the railroad of 5.25 to 5.5 per cent.
Chesapeake & Ohio, Series 1929.....	1930-44	5,025,000	4½	96.57	5.05	4.90-5.75	Bankers Co. of New York, Continental Illinois Co., and Evans, Stillman & Co.
Chicago & Eastern Illinois, Series B....	1930-43	562,000	5	99.51	5.078	.....	Halsey Stuart & Co.
Chicago & Illinois Western.....	1932-36	500,000	5	100	5	.....	.....
Chicago & North Western, Series V & W	1930-44	8,775,000	4½	84.297	5.4359	5.125-6	Bankers Co. of New York, Continental Illinois Co., and Evans, Stillman & Co.
Chic., Indianapolis & Louisville, Series E	1930-44	520,000	5	99.917	5.5	.....	Harris Trust & Savings Bank and Porter & Co.
Chicago, Milwaukee, St. Paul & Pacific, Series J	1930-44	8,370,000	5	98.08	5.313	5.05-5.75	Halsey Stuart & Co.
Chicago & North Western, 1925, Series Q	1930-40	3,971,000	4½	97	.....	.....	.....
Chicago, Rock Island & Pacific, Series P	1930-44	9,450,000	4½	94.697	5.367	5.15-6	Bankers Co., N. Y., Continental Illinois Co., Evans, Stillman & Co.
Chicago, St. Paul, Minneapolis & Omaha, Series G	1929-39	690,000	4¾	98.46	5.085	.....	Halsey Stuart & Co.
Columbus & Greenville, Series A.....	1930-39	450,000	5½	par	....	.....	Delivered to Amer. Car & Foundry Co. in ratio of $1500 in trust notes and $400 in cash in payment for 300 box cars.

Equipment Trust Certificates (Continued)

Erie, Series of 1929	1930-44	8,370,000	4½	94.847	5.3667	5.15-6	First Nat'l Corp. of Boston, Harrison Smith & Co., and Kean Taylor & Co.
Grand Trunk Western, Issue of 1929	1930-44	4,238,000	5	.....	.....	.....	To be used as security for temporary financing at a cost to the railroad of 5.25 to 5.5 per cent.
Illinois Central, Series P	1930-44	6,990,000	4½	96.637	5.04	4.90-5.75	Bankers Co. of New York, Continental Illinois Co., and Evans, Stillman & Co.
Maine Central	1929-44	1,628,000	5	100	5	.....	Issue taken by Standard Steel Car Co.
Missouri Pacific, Series F	1930-44	8,925,000	4½	95.7	5.198	4.95-5.75	First Nat'l Bank of City of N. Y., Salomon Bros. & Hutzler.
New York, Ontario & Western	1930-39	660,000	5	97	5.696	.....	Chase Securities Corp. and Freeman & Co.
New York Central	1930-44	6,300,000	4½	96.84	5.008	Min.4.90	Edw. Lowber Stokes & Co.
New York Central, Series of 1929	1930-44	10,200,000	4½	94.919	5.3846	5.15-6	Chase Securities Corp. and Freeman & Co.
New York, Chicago & St. Louis, Series of 1929	1930-44	2,400,000	4½	95.773	5.1856	5.05-5.50	Harrison Smith & Co., First Nat'l Corp., Boston, and Kean Taylor & Co.
New York, New Haven & Hartford	1929-43	2,610,000	4½	.....	.....	.....	Held in Treasury.
New York Central	1930-44	5,895,000	4½	97.02	4.978	.....	Chase securities Corp. and Freeman & Co.
Southern, Series CC	1930-44	3,690,000	4½	95.517	.....	.....	.....
Southern Pacific, Series L	1930-44	6,825,000	4½	95.41	5.246	.....	Estabrook & Co., Edw. Lowber Stokes & Co., Old Colony Trust Co., and R. L. Day & Co.
Texas & Pacific, Series C	1930-44	2,685,000	4½	94.455	5.409	5.15-5.75	Harris Trust & Savings Bank and First Union Trust & Savings Bk. of Chicago.
Wabash, Series H	1930-44	3,375,000	4½	96.79	5.0166	Min.4.85	Edw. Lowber Stokes & Co.
Western Pacific, Series D	1929-43	1,095,000	5	97.25	5.46	.....	Halsey, Stuart & Co.

The largest flotation of bonds was that of the Canadian National which sold three issues totaling $90,000,000. The Chicago & North Western floated an issue of $72,335,000 offering it first to stockholders, the remainder to be taken by the bankers. The Southern Pacific first offered its bonds also to stockholders, each $1,000 bond to carry purchase warrants for three shares of common stock.

As the year drew to a close several large stock offerings were in view for 1930—among them an issue of stock to be sold to employees by the Baltimore & Ohio and a proposed four-to-one split by the Chesapeake & Ohio.

Railroads in the Hands of Receivers

The year 1929 closed with 5,261 miles of railroad in the hands of receivers, being an increase of five miles from the mileage operated by receivers a year ago. Companies in receivership declined from 33 a year ago to 31 at the end of 1929. This was the second lowest mileage operated by receivers since 1911 and the smallest number of companies in receivership since 1907.

The outstanding changes in the general situation were the return to corporate control of the Central Vermont and the establishment of a receivership for the Georgia & Florida. It is worthy of note that receivership for both these properties came from one cause, namely, bad weather—floods. The Central Vermont, it will be remembered, was overwhelmed by probably the most wholesale destruction ever visited on a single railway in the Vermont flood of 1927. Receivership followed and the property was thoroughly rehabilitated with funds advanced by the Canadian National, which held a majority of the stock of the old company. At a foreclosure sale this year the property was acquired by the Central Vermont Railway, Inc., all the securities of which are owned by the Canadian National.

Among railroads listed in the *Railway Age* a year ago as in receivership, the following, in addition to the Central Vermont, have passed to corporate control: Atlantic & Yadkin, Carrollton & Worthville, Delaware & Northern and Eastern Kentucky. Operation of the Pine Bluff & Northern, listed last year as in receivership, has been discontinued.

Table IV—Receiverships Established in 1929

Name of road	Mileage	Funded debt outstanding	Capital stock outstanding
Georgia & Florida	446	$13,379,441	$6,492,000
Oklahoma Union	14	1,340,950	750,000
Rio Grande	174	4,509,000	4,510,000
Three companies	634	$19,229,391	$11,752,000

Table V—Foreclosure Sales in 1929

Name of road	Mileage	Funded debt outstanding	Capital stock outstanding
Carrollton & Worthville	10	$95,000	$20,000
Central Vermont	493	13,194,165	3,000,000
East Kentucky	13	none	3,455,900
Harrisville Southern	6	.....	.....
Winchester & Western	40	600,000	350,000
Five companies	562	$13,889,165	$6,825,900

Table VI—Railroad Mileage in the Hands of Receivers

(Figures to 1928, Inclusive, from I. C. C. Statistics for Year Ended December 31, 1928. Figures for 1929 Compiled by *Railway Age*)

Year ended	Miles of road operated by receivers at close of year	Net change during the year in miles of road operated	Number of roads in charge of receivers at close of year
June 30, 1894	40,819	.....	192
1895	37,856	—2,963	169
1896	30,476	—7,380	151
1897	18,862	—11,614	128
1898	12,745	—6,117	94
1899	9,853	—2,892	71
1900	4,178	—5,675	52
1901	2,497	—1,681	45
1902	1,475	—1,022	27
1903	1,185	—290	27
1904	1,323	+138	28
1905	796	—527	26
1906	3,971	+3,175	34
1907	3,926	—45	29
1908	9,529	+5,603	52
1909	10,530	+1,001	44
1910	5,257	—5,273	39
1911	4,593	—664	39
1912	9,786	+5,193	44
1913	16,286	+6,500	49
1914	18,608	+2,322	68
1915	30,223	+11,615	85
1916	37,535	+7,130	94
Dec. 31, 1916	34,804	—*2,550	80
1917	17,376	—17,428	82
1918	19,208	+1,832	74
1919	16,590	—2,618	65
1920	16,290	—300	61
1921	13,512	—2,778	68
1922	15,259	+1,747	64
1923	12,623	—2,636	64
1924	8,105	—4,518	61
1925	18,687	+10,582	53
1926	17,632	—1,055	45
1927	16,752	—880	40
1928	5,256	—11,496	33
1929	5,261	+5	31

* Represents decrease for six months.

Table III—Railway Securities Sold to Public in 1916 and 1920 to 1929

Year	Bonds	Notes	Stock	Total R.R. financing	Total all financing	Per cent R. R. to total
1916	$229,000,000	$126,000,000	$16,000,000	$371,000,000	$1,864,000,000	19.90
1920	194,583,000	193,840,000	3,737,000	392,160,000	3,324,922,000	12.12
1921	455,125,000	202,928,300	27,222,500	685,275,800	2,780,874,000	24.64
1922	299,025,800	288,936,500	27,068,100	615,030,400	3,200,176,000	19.22
1923	165,956,000	354,720,500	59,140,850	579,817,350	3,602,704,000	16.04
1924	620,347,000	351,276,200	11,000,000	982,623,200	4,185,590,000	23.46
1925	374,020,500	151,753,740	30,934,430	556,708,670	5,234,992,000	10.63
1926	241,954,000	172,477,000	41,577,200	456,008,200	5,746,354,000	7.94
1927	686,939,500	89,184,600	210,596,900	986,721,000	7,830,641,000	12.61
1928	525,719,000	79,911,000	187,369,100	792,999,100	8,473,880,000	9.4
*1929	388,984,000	174,427,000	179,244,390	742,655,390	10,695,459,390	6.9

* 11 Months 1929

Table VII—Railroads in the Hands of Receivers on December 31, 1929

Road	Mileage operated	Mileage owned	Date of receivership	Funded debt outstanding	Capital stock outstanding	Total old company securities	Remarks
Alabama, Florida & Gulf	32	32	June 23, 1924	None	$50,000	$50,000	Receivers discharged on March 23 but reorganization not yet effected.
Bridgton & Saco River	21	21	Oct. 1, 1927	$170,000	102,250	272,250	
Bristol Railroad	6	6	July 16, 1926	100,000	100,000	200,000	Seeking authority from N. H. Commission to discontinue operation.
California & Oregon Coast	15	15	Feb. 18, 1925	528,200	350,000	903,200	
Cape Girardeau Northern	15	104	April 14, 1914	1,156,000	110,000	1,441,900	
Caro Northern	17	17	July 23, 1919	.....	.....	.....	
Chicago & Alton	1,029	691	Aug. 30, 1922	84,184,000	39,955,500	128,387,200	
Gainesville & Northwestern	37	35	Dec. 8, 1923	75,000	750,000	850,000	
Gainesville Midland	74	72	Feb. 15, 1921	949,285	550,000	1,549,285	See *Railway Age*, Jan. 5, 1929, page 67.
Georgia & Florida	459	503	Oct. 21, 1929	6,489,000	13,382,441	20,496,441	Capital stock includes 100,000 shares common of no par value.
Gulf, Texas & Western	130	99	Jan. 24, 1921	2,000,000	500,000	2,500,000	Will be purchased by S. L.-S. F. if I.C.C. approves.
Kansas & Oklahoma	19	19	Apr. 17, 1923	None	288,900	288,900	
Minneapolis & St. Louis	1,628	1,514	July 26, 1923	41,359,051	25,792,600	69,671,426	
Missouri & North Arkansas	365	335	May 5, 1927	3,500,000	3,000,000	6,845,000	
Nevada Copper Belt	41	41	Apr. 2, 1925	622,000	.....	622,000	
North & South	41	41	Aug. 1, 1924	None	None	None	Court order judgments $4,911,771.
Ohio & Kentucky	40	38*	Dec. 2, 1925	447,775	300,000	757,775	
Oklahoma Union	14	27	July 1, 1929	750,000	1,340,950	2,090,950	
Paris & Mt. Pleasant	51	51	Feb. 26, 1920	600,000	75,000	765,000	
Pittsburg, Shawmut and Northern	199	178	Aug. 1, 1905	14,655,600	15,000,000	31,377,950	
Rio Grande Southern	174	174	Dec. 13, 1929	4,509,000	4,510,000	9,019,000	
Sandy River & Rangeley Lakes	97	97	July 8, 1923	837,000	340,000	1,177,000	
Savannah & Atlanta	147	147	Mar. 4, 1921	3,365,000	2,250,000	6,393,622	Security holders formulating reorganization plan.
Sharpsville Railroad	21	21	Jan. 21, 1897	None	350,000	350,000	
Tallulah Falls Railway	57	57	June 24, 1923	1,519,000	323,400	1,857,400	
Trinity & Brazos Valley	367	303	June 16, 1914	8,760,000	304,000	11,351,590	
Virginia Southern	8	8	May 3, 1926	75,000	25,000	100,000	
White River	19	19	May 31, 1928	279,000	250,000	687,050	
Wichita Northwestern	100	100	Nov. 10, 1922	381,750	1,690,000	2,121,750	
Winchester & Western	40	40	June 21, 1926	600,000	350,000	980,000	Sold at foreclosure but still operated by receivers.
Winifrede Railroad	11	11	Mar. 15, 1927	None	150,000	150,000	

* *Includes leased line also.*

Table VIII—Summary of Railroad Receiverships and Foreclosure Sales, 1876 to 1929

	Roads Placed in Receivership			Summary of Foreclosure Sales				Roads Placed in Receivership			Summary of Foreclosure Sales		
Year	Number of roads	Miles	Bonds and stocks	Number of roads	Miles	Bonds and stocks	Year	Number of roads	Miles	Bonds and stocks	Number of roads	Miles	Bonds and stocks
1876	42	6,662	$467,000,000	30	3,840	$217,848,000	1903	9	229	18,823,000	13	555	15,885,000
1877	38	3,637	220,294,000	54	3,875	198,984,000	1904	8	744	36,069,000	13	524	28,266,000
1878	27	2,320	92,385,000	48	3,906	311,631,000	1905	10	3,593	176,321,000	6	679	20,307,000
1879	12	1,102	39,367,000	65	4,909	243,288,000							
1880	13	885	140,265,000	31	3,775	263,882,000	1906	6	204	55,042,000	8	262	10,400,000
							1907	7	317	13,585,000	6	114	13,777,000
1881	5	110	3,742,000	29	2,617	137,923,000	1908	24	8,009	596,359,000	3	138	2,547,000
1882	12	912	39,074,000	16	867	65,426,000	1909	5	859	78,095,000	12	2,629	250,033,000
1883	11	1,990	108,470,000	18	1,354	47,100,000	1910	7	735	51,427,500	17	1,100	93,660,109
1884	37	11,038	714,755,000	15	710	23,504,000							
1885	44	8,836	385,460,000	22	3,156	278,394,000	1911	5	2,606	210,606,882	13	1,386	40,741,543
							1912	13	3,784	182,112,497	12	661	25,910,990
1886	13	1,799	70,346,000	45	7,687	374,109,000	1913	17	9,020	477,780,820	6	1,159	86,163,850
1887	9	1,046	90,318,000	31	5,478	328,181,000	1914	22	4,222	199,571,446	9	1,470	83,189,500
1888	22	3,270	186,814,000	19	1,596	64,555,000	1915	12	20,143	1,070,808,628	11	3,914	285,258,782
1889	22	3,803	99,664,000	25	2,930	137,815,000							
1890	26	2,963	105,007,000	29	3,825	182,495,000	1916	9	4,439	208,159,689	26	8,355	703,444,855
							1917	19	2,486	61,169,962	20	10,963	557,846,348
1891	26	2,159	84,479,000	21	3,223	169,069,000	1918	8	3,519	242,090,800	11	763	24,735,187
1892	36	10,508	357,692,000	28	1,922	95,898,000	1919	7	244	11,886,779	8	459	15,479,587
1893	74	29,340	1,781,046,000	25	1,613	79,924,000	1920	10	541	21,620,150	7	380	7,676,200
1894	38	7,025	395,791,000	42	5,643	318,999,000							
1895	31	4,089	369,075,000	52	12,831	761,791,000	1921	14	1,744	63,872,113	11	4,173	306,123,942
							1922	12	4,330	329,114,860	15	6,151	299,491,646
1896	34	5,441	275,597,000	58	13,730	1,150,377,000	1923	10	2,218	87,913,581	8	637	14,622,900
1897	18	1,537	92,909,000	42	6,675	517,680,000	1924	11	920	30,223,372	14	3,992	269,251,082
1898	18	2,069	138,701,000	47	6,054	252,910,000	1925	6	11,368	680,422,080	6	638	9,965,000
1899	10	1,019	52,285,000	32	4,294	267,534,000							
1900	16	1,165	78,234,000	24	3,477	190,374,000	1926	6	38	2,821,400	12	12,852	626,662,708
							1927	6	924	45,236,674	5	142	4,254,000
1901	4	73	1,627,000	17	1,139	85,808,000	1928	1	19	529,000	4	209	6,393,250
1902	5	278	5,835,000	20	693	39,788,000	1929	3	634	30,981,391	5	562	20,715,065

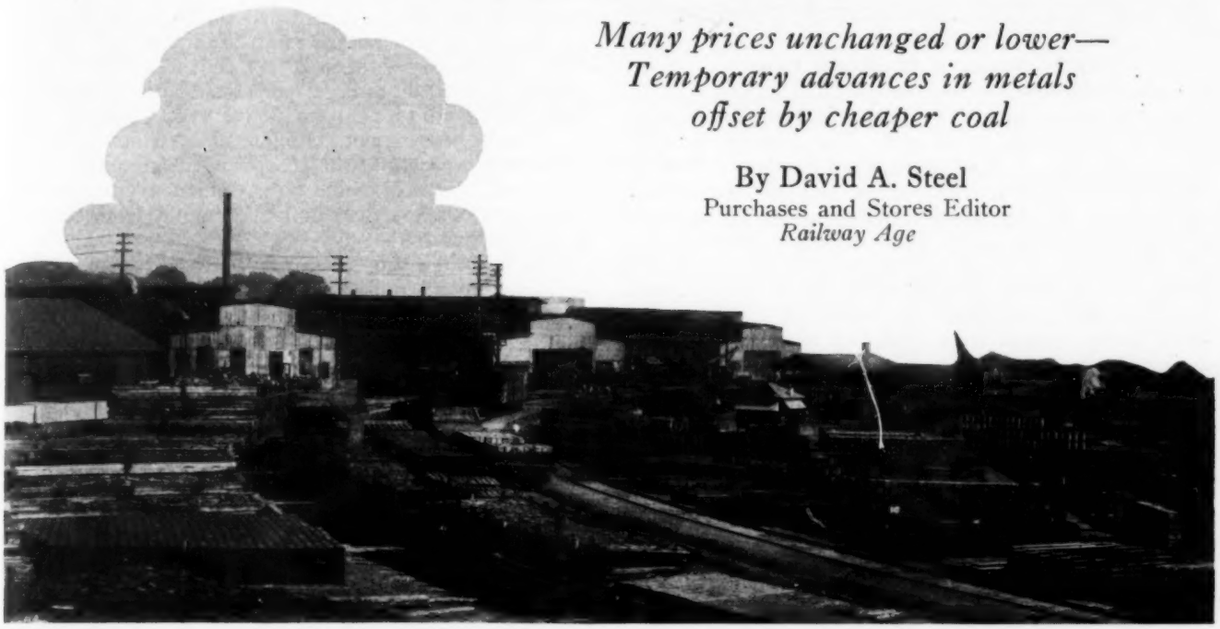
* * * *

Parlor-Dining Car Built for the Missouri Pacific by the American Car & Foundry Company

Railway Material and Supply Costs in 1929

Many prices unchanged or lower—Temporary advances in metals offset by cheaper coal

By David A. Steel
Purchases and Stores Editor
Railway Age



The Railways Buy Vast Quantities of Materials in the Nation's Markets

BUSINESS will remember 1929 for a spectacular advance and a spectacular collapse of the market value of corporation stocks. The year was also eventful industrially—steel plant operations, automobile production and rail traffic making new records, and then almost losing the gain by let-downs in the closing months. Railway material prices also had their ups and downs, but their deviation from previous trends was slight and many reductions occurred in the face of expanding business. On the whole, iron and steel prices were higher last year than in 1928, with a downward trend toward the end of the year. Miscellaneous materials were higher, forest products slightly higher, fuel substantially lower. Rail, as usual, was stationary. Because of the quantities of fuel and rail purchased, the prices at which they were bought offset higher prices in other lines of expenditure and the year closed with the purchasing power of the railway dollar in the material markets on a par, if not slightly better, than it was in the previous 12 months. Prospects are for slightly lower prices this year.

Experiences Vary

Three of 11 roads paid higher fuel prices last year than in the year before, 4 paid lower prices and 4 about the same prices. Iron and steel prices were higher on 5 of 11 roads, the same on 3 roads and lower on 3 roads. Tie costs were the same on 7 of 11 roads, higher on 2 roads and lower on 2 others. Lumber prices were higher on 5 roads, unchanged on 5 roads and lower on 1 road. Four of 10 roads sold their scrap iron for the same prices as prevailed in 1928, while 5 got more for it and 1 sold it for less.

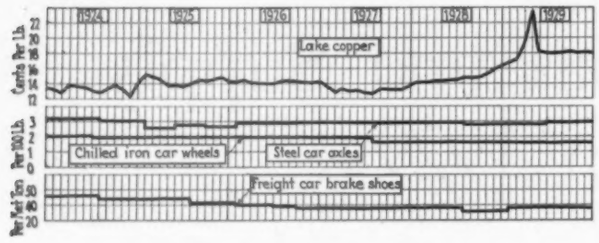
A compilation has been made of the prices paid by a large number of railroads for some 60 representative materials. Fourteen of 26 iron and steel items showed an average increase over their corresponding average prices in 1928 and 8 items showed a decrease. Except for cast iron pipe, the average increases in prices were only fractional. The same is true of the decreases, and the net increase of all the iron and steel items was only three per cent. The average increase in scrap iron prices was eight per cent.

Eighteen of 29 miscellaneous materials showed average prices above those in 1928 and 10 showed lower prices. The increases in the average prices paid for the copper items and paint supplies in this class were substantial, but except for these, both increases and reductions were slight, and 29 items, taken together, showed an increase of only 2 per cent.

The change in the average price of forest products was a net increase, while fuel oil showed a reduction of more than 20 per cent and coal a reduction of 5 per cent, the latter representing the average reduction for all Class I roads. The average price of all items compiled and prorated in accordance with the relation which the purchases of each class bear to total expenditures yielded an index figure of 99, as compared with 100 in 1928.

Iron and Steel Prices Higher

Iron and steel prices owed their advance, where advances occurred, to the unusual activity in the automobile industry and the enlarged purchases of the railways themselves, particularly for equipment. The year opened with prices at their peak for 1928 and these were carried forward by a period of business activity not seen in many years. For several months, the mills



Price Trends of Equipment Items

were pressed to capacity and the usual midsummer letdown in operations was absent. The pressure on mills was a surprise to both buyers and sellers. Unfilled orders accumulated. The large buyers, particularly those who had not underestimated needs and planned requirements well ahead, were favorably situated, but the market was strong and many prices rose to new levels. Some roads paid $8 a ton more for structural steel and $10 a ton more for bolts and cast iron pipe, while higher prices were recorded in connection with castings and sheet iron.

Competition and Deliveries

Strictly railway materials and particularly maintenance of way materials, for the most part, were steady, however. In some cases, they cost considerably less than before. This was true of brake shoes, for example, among the maintenance of equipment materials, while some roads paid three dollars or four dollars a ton less for track bolts and tie plates. The law of demand asserted itself in 1929 in connection with iron and steel prices but its tendency to disturb the relative stability of prices was opposed by keen competition among sellers for business and by controlled buying, accompanied by the continued avoidance of surplus stocks. Deliveries continued satisfactory, even at the peak of the season.

Iron and steel production began diminishing in August and the majority of prices weakened. The stock market crash, coming in late October, was also a weakening factor. The equipment buying by the railroads —a big factor in the market—continued strong and the seasonal orders for rail and track materials also had a stabilizing effect, but the year closed with iron and steel prices tending slightly downward. The closing prices of many commodities were lower, in fact, than they were in the corresponding period of the previous year and the trend was the reverse of that in the last quarter of 1928.

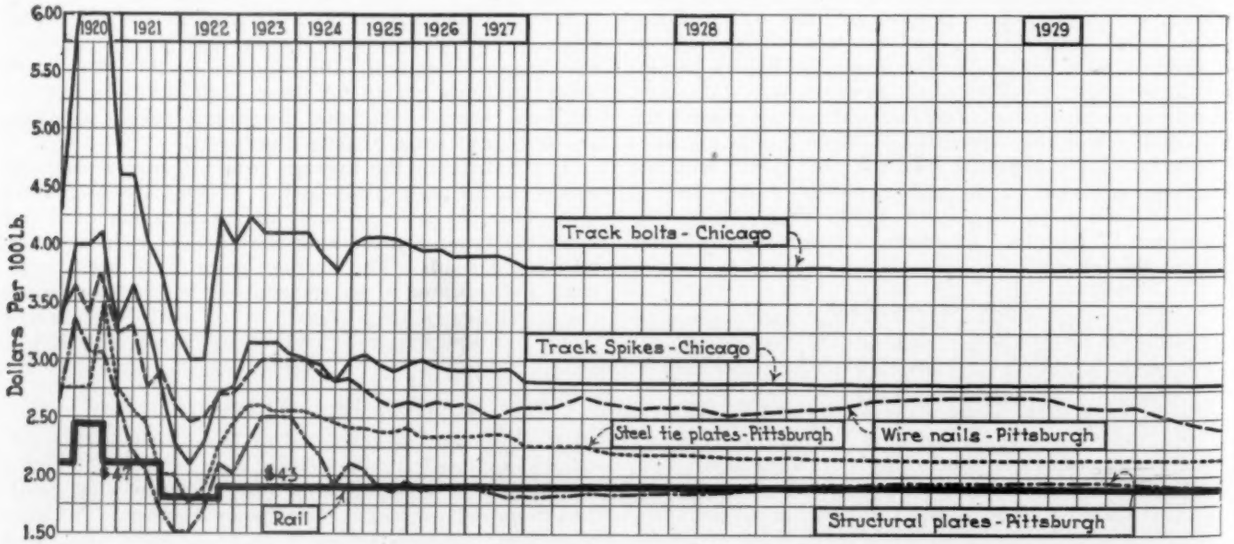
Closing Prices

Closing prices of locomotive driving axles on representative roads ranged from $3.90 per cwt. to $5.05, excepting vanadium axles which closed at $8.00. Closing car axle prices ranged from $2.65 to $4.50 per cwt. Bar iron, which averaged 20 per cent less than in 1928, ranged from $1.89 to $2.05 per cwt. Comparable boiler steels averaged 15 per cent above 1928, ranging from $1.75 to $2.46 per cwt. Boiler tubes, which remained stationary throughout the year, ranged from 16½ to 18 cents per foot. Machine bolts, which averaged about three per cent less than in 1928, ranged from $4.35 to $5.04 per hundred.

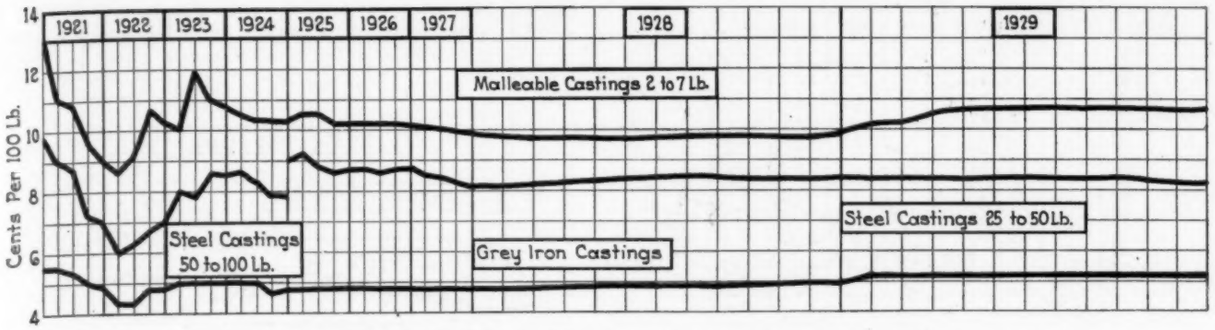
Closing brake shoe costs ranged from $36 to $53 per ton, counting all kinds reported, and locomotive shoes of all kinds ranged from $43 to $69. Grey iron castings ranged from $3.25 to $5.50 per cwt., and 7 to 15-lb. malleable castings, from $6.25 to $10.75, while 25 to 50-lb. steel castings ranged from $4.80 to $10.55 per cwt. at the close. Couplers ranged from $31.55 to $47.20 per pair, nails from $2.20 to $3.35 per cwt., pig iron from $15 to $21 per ton and steel pipe from 5.9 to 7.5 cents per foot.

Closing mill prices of cast iron pipe, for which the majority of roads paid more than last year and which averaged 15 per cent higher, ranged from $35 to $41 per ton. Sheet iron ranged from $2.68 to $4.85 per cwt., spring steel from $2.09 to $3.50 per cwt., structural angles from $1.85 to $2.73, locomotive tires from $5.60 to $6.70 per cwt., tool steel from 55 to 61 cents per lb. One road paid $2 for a special grade. Closing tie plate prices ranged from $38 to $44 per ton, including those containing copper. Track bolts ranged from $3.10 to $4.05, track chisels from $1.25 to $1.80 each, while closing track spike prices, which averaged on a par with 1928, ranged from $2.20 to $2.80 per hundred, including copper content flues bought by one railroad at $2.75.

Iron and steel prices may not go lower this year but they will not advance. The opinions of nine purchasing agents stand: Eight for the same prices, one for



Typical Iron and Steel Items Used in Roadway and Structures



Trend of Mill Prices for Various Materials Used in Car and Locomotive Work

lower prices and none for higher prices. Four of nine representative buyers plan to buy the same quantity of rail as in 1928, three more, and two less, while enlarged equipment buying is expected to be continued.

Scrap Iron Prices

Scrap iron invites special attention because it is a substantial source of income to railroads, netting them many million dollars a year. Railroad scrap is a preferred product among scrap buyers, and the railroads are getting more and more, relatively, from their scrap by better sorting and classification. In recent years, scrap iron has been faring a shade better than pig iron as raw material for the manufacture of finished products and it is significant that scrap prices registered advances last year while pig iron prices declined. Exports were a large factor in scrap prices as well as the domestic consumption and, on the whole, the prices averaged higher last year than the year before, the net increase for three representative items being 10 per cent. There were fluctuations, however, throughout the year, and by midsummer a downward trend was evident and, in the majority of cases, scrap was sold for less at the close of last year than at the beginning. The closing prices on representative roads ranged from $9.82 to $14.88 a ton for No. 1 wrought, $9.24 to $15.50 for No. 1 melt and $11.80 to $15.75 for rail for rerolling.

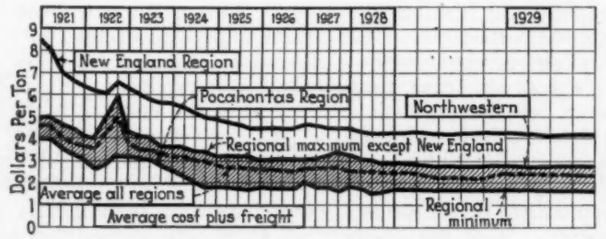
Average Prices Paid by Railroads for Material in 1929

Material	Unit	Roads	Jan.	June	Dec.	Index*
Iron and Steel						
Axles, locomotive driving	cwt.	13	$4.91	$4.84	$4.78	93
Axles, 5 by 9 car	cwt.	13	2.91	2.92	3.01	102
Bar iron, common	cwt.	8	2.16	2.19	2.16	84
Boiler steel	cwt.	13	2.31	2.34	2.35	116
Boiler tubes, 2¼ in.	ft.	12	.17	.17	.17	102
Bolts, machine, ¾ by 6	100 pcs.	12	4.90	4.90	4.81	97
Brake shoes, freight	n.t.	5	37.82	37.63	37.20	94
Brake shoes, locomotive	n.t.	12	59.70	59.60	59.34	96
Castings, grey iron	cwt.	8	4.13	4.11	4.12	104
Castings, mall., 7 to 15 lb.	cwt.	13	8.38	8.92	8.76	102
Castings, steel, 25 to 50 lb.	cwt.	13	8.31	8.37	8.29	104
Couplers, 5 by 7 by 6½	pr.	13	39.89	40.33	37.27	101
Nails, wire	cwt.	13	2.68	2.66	2.52	100
Pig iron	n.t.	5	17.12	17.37	17.57	99
Pipe, 1-in. black steel	ft.	11	.066	.066	.066	96
Pipe, 12-in. cast iron	n.t.	11	39.55	39.82	38.88	117
Sheet steel, 28 gage	cwt.	11	3.33	3.09	3.33	108
Spring steel	cwt.	13	2.96	2.78	2.78	108
Structural steel, angles	cwt.	13	2.34	2.36	2.34	115
Structural steel, fabricated	cwt.	8	2.97	3.50	3.51	97
Tires, locomotive	cwt.	13	5.48	6.03	6.03	97
Tool steel, high speed	lb.	12	.57	.57	.57	98
Tie plates, steel	n.t.	12	42.22	42.19	41.90	99
Track bolts	cwt.	13	3.75	3.76	3.76	96
Track chisels	cwt.	13	1.74	1.74	1.74	99
Track spikes	cwt.	13	2.72	2.72	2.69	99
Miscellaneous Materials						
Bond wire, copper clad	cwt.	6	18.47	18.66	18.57	106
Sheet copper, soft	lb.	12	.281	.258	.272	117
Copper tubing, ⅜-in.	lb.	11	.288	.300	.318	109
Copper wire, No. 9 bare	lb.	10	.191	.199	.195	116
Weatherproof wire, No. 10	lb.	10	.204	.217	.209	107
Journal bearings	lb.	10	.167	.183	.153	108
Pig lead	cwt.	10	6.88	7.02	6.96	108
Fire brick	M.	13	41.71	41.70	41.80	97
Boiler lagging, 2 in.	sq. ft.	12	.236	.236	.236	108
Glass, 24 by 24 dsa.	box	13	5.61	5.80	5.89	112
Car oil	gal.	11	.157	.158	.157	100
Grease, driving box	lb.	11	.125	.127	.125	102
Waste, colored cotton	lb.	13	.087	.086	.086	94
Linseed oil, boiled	lb.	13	.104	.109	.140	127
White lead, in oil	lb.	13	.104	.104	.106	102
Rubber, 3/32 sheet packing	lb.	8	.253	.253	.236	88
Hose, 1½ air brake	ft.	13	.443	.447	.441	97
Leather belting, 6 in. double	ft.	12	1.40	1.40	1.39	103
Cable, ¾-6 strand, plow steel	ft.	13	.144	.144	.144	120
Rope, ¾ manila	lb.	13	1.956	2.019	2.019	100
Wire fence, 26 to 55 woven	rod	11	.429	.428	.424	88
Pipe, 24 in. vit. clay	ft.	8	1.154	1.165	1.178	122
Track shovels, No. 2	doz.	13	10.82	11.52	11.52	82
Oxygen	100 cu. ft.	13	1.05	1.04	1.02	100
Creosote oil	gal.	9	.141	.139	.139	100
Hydrated lime	n.t.	12	12.00	11.96	11.92	100
Soda ash	cwt.	13	1.49	1.42	1.47	104
Cement, Portland	bbl.	13	1.93	1.92	1.77	100
Fuel						
Coal (See separate table)						95
Fuel oil	bbl.	13	1.31	1.15	1.20	74
Kerosene	gal.	12	.089	.085	.088	97
Ties and Timber						
Fir boards, 1 by 6 R. Com.	M ft.	7	19.78	19.85	20.42	
Southern pine, 2 by 4 Com. S. 4 S.	M ft.	5	26.10	26.45	26.10	
Fir car sills, 6 by 10 by 40	M ft.	5	21.40	21.70	21.40	
Fir br. stringers, 8 by 6 by 28	M ft.	6	21.60	20.40	20.40	
White oak ties, 7 by 8 by 8½	ea.	11	1.00	1.01	1.02	
Fir ties, 7 by 8 by 8½	ea.	6	.76	.76	.76	
Pine ties, 7 by 8 by 8½	ea.	11	.92	.92	.92	
Scrap Iron						
No. 1 wrought	n.t.	10	12.37	11.93	11.59	105
No. 1 melting steel	n.t.	13	13.28	12.85	12.35	112
Rails for rerolling	n.t.	9	14.70	14.84	13.95	112

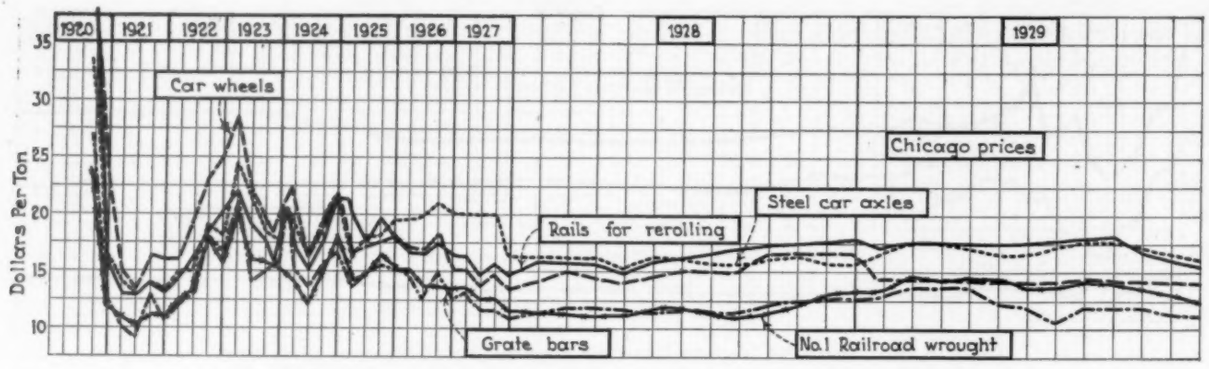
* Represents comparison of year's average with corresponding average in 1928, expressed in per cent.

Coal and Fuel Oil Cheaper

Fuel conditions were quiet. In the coal fields, excessive mine capacity exists and consumption by many large consumers is lower. This applies to railroads which are burning less fuel per thousand gross ton-miles than ever before. In the West and Southwest fuel oil competes with coal and production of fuel oil itself has been so excessive as to prove almost as large a source of concern to petroleum interests as coal mine conditions are to coal interests. In some sections, gas and oil are available for prices which have led commercial plants to abandon coal. No changes have occurred in the working conditions in the coal fields and organized fields are in competition with large non-union fields. In some regions, operators, through mergers and



Average Cost of Coal to Railroads



Monthly Variation in Typical Scrap Prices in the Last Ten Years

agreements, have effected more constructive sales, starting with restricted mine operations, but the majority of roads got cheaper coal notwithstanding. This will appear from the table of comparative prices paid by Class I roads during the first nine months of 1928 and 1929.

Coal Prospects

Coal prices this year will not be greater and may be lower than last year. It is not likely that the demands on the mines will be greater this year than last year, either for general consumption or railway needs. The prospects of railway buying on representative roads stand: Four for no increase, two for larger purchases and four for smaller purchases. The need for storing coal is practically absent. Labor leaders have agreed to co-operate with the government to avoid strikes or other interruptions that might be expected to follow in the wake of last year's stock market collapse, and railways are constantly improving their methods to allow the purchase of larger quantities of unsorted, therefore cheaper, coal. The opinions of representative railway buyers stand: Eight for stationary prices, one for higher prices and one for lower prices.

The fuel oil market is a little stronger because of the success in some sections in curtailing production. There has also been a marked increase in the refining of fuel oil to promote its wider use commercially. The oils of higher gravity are being blended and their sale has a tendency to reduce the oil supply for railroad use. However, the supply is still large and the price low. There is no immediate likelihood of a shortage and it is improbable that prices will differ much one way or the other from the levels of the last 12 months. The closing costs to railways ranged from 50 cents per bbl. to $2.10.

Forest Products

In both the Southern Pine territory and along the Pacific coast, where most forest products are now produced, the mills have succeeded in keeping production more nearly balanced with demand. Southern pine is rapidly diminishing, moreover. During the last year approximately six of the largest mills discontinued operations in that territory. Increases in export business last year also gave strength to forest products. However, building operations throughout the country were considerably less during the past year than in the previous year and unfavorable economic conditions are still forcing many western mills to produce beyond their immediate needs to meet fixed charges on their investments. With the competition from substitutes, moreover, to say nothing of the competition existing between different lumber-producing sections, railroads were again able to buy favorably last year.

The increases in prices reflect the larger amount of equipment building, calling for quick deliveries to meet relatively unanticipated needs, also the purchase of better grades and the shipment of lumber from more distant sources. The advances, while affecting general averages, were not universal or permanent, and, in most cases, the higher prices paid showed decided tendencies downward during the last quarter.

Hardwood prices were higher last year. The price problem in this field, however, is steadily less important with the rapidly diminishing use of hardwood lumber for railway use, particularly in car construction where steel members have almost completely replaced it as a structural material.

Adopt New Grading Rules

During the year, the grading rules for West Coast lumber were revised and the revised rules adopted by the railroads. It is believed by some that these rules will increase unit prices but it is more generally contended that their use will facilitate procurement through standardization and thus reduce ultimate costs as well as stabilize the industry. The effect on prices remains to be seen.

It is improbable that equivalent grades of forest products will increase in price this year. The opinions on railway buying stand: Six for no increase in purchases, none for larger purchases and three for reduced purchases; while the opinions regarding prices stand: Seven for no change in prices, none for higher prices and two for lower prices. The closing prices last year by roads tapping sources of supply ranged from $16 to $35 for 1-in. by 6-in. fir boards of comparable size and grade, $20 to $32 for 2 in. by 4 in. pine,

Average Cost of Coal Per Ton—First Nine Months

Region and road	With freight 1929	With freight 1928	Without freight 1929	Without freight 1928
New England Region:				
Bangor & Aroostook			$4.58	$4.49
Boston & Albany	$4.31	$4.39	1.90	1.94
Boston & Maine	4.55	4.53	4.55	4.52
Central Vermont	4.75	4.92	1.62	2.22
Maine Central	4.79	4.80	4.79	4.80
New York, New Haven & Hart...	3.67	3.90	1.36	1.48
Rutland	4.06	4.14	2.36	3.74
Great Lakes Region:				
Ann Arbor	3.01	3.12	1.24	1.33
Buffalo, Rochester & Pittsburgh..	1.74	1.78	1.74	1.78
Delaware & Hudson	3.74	3.27	3.17	2.57
Delaware, Lackawanna & Western	3.27	3.26	2.03	1.98
Erie and Chicago & Erie	2.53	2.65	1.70	1.84
Grand Trunk System	3.17	3.57	1.47	1.67
Lehigh & Hudson River	3.84	3.88	1.31	1.36
Lehigh & New England	3.12	3.58	1.76	2.42
Lehigh Valley	3.28	3.41	1.42	1.49
Michigan Central	3.60	3.84	2.43	2.54
New York Central	2.37	2.48	1.95	2.01
New York, Chicago & St. Louis..	2.71	2.91	1.78	1.93

Region and road	With freight 1929	With freight 1928	Without freight 1929	Without freight 1928
New York, Ontario & Western	3.14	3.35	1.41	1.46
Pere Marquette	3.39	3.48	1.57	1.66
Pittsburgh & Lake Erie	1.83	1.90	1.66	1.73
Pittsburgh & West Virginia	1.49	1.84	1.49	1.84
Wabash	2.10	2.32	1.83	1.95
Central Eastern Region:				
Akron, Canton & Youngstown	2.51	2.82	1.50	1.72
Baltimore & Ohio	1.60	1.67	1.57	1.64
Bessemer & Lake Erie	2.01	2.28	1.93	2.21
Central of New Jersey	3.47	3.57	1.55	1.56
Chicago & Eastern Illinois	2.08	2.22	2.04	2.13
Chicago, Indianapolis & Louisville	1.92	2.18	1.92	2.18
Cleveland, Cin., Chic. & St. Louis	2.65	2.77	1.94	2.13
Detroit, Toledo & Ironton	2.94	3.05	1.88	2.04
Elgin, Joliet & Eastern	2.21	2.36	2.21	2.36
Hocking Valley	1.75	1.87	1.74	1.86
Long Island	3.84	4.24	1.64	1.93
Pennsylvania System	1.85	1.91	1.82	1.86
Reading Company	2.85	2.99	1.69	1.82
Western Maryland	1.83	1.92	1.83	1.91
Wheeling & Lake Erie	1.67	1.75	1.67	1.74
Pocahontas Region:				
Chesapeake & Ohio	1.57	1.59	1.57	1.59
Norfolk & Western	1.58	1.62	1.58	1.62
Richmond, Fred. & Potomac	3.40	3.59	1.16	1.36
Virginian	1.96	1.96	1.96	1.96
Southern Region:				
Alabama Great Southern	2.46	2.68	2.02	2.39
Atlanta & West Point	3.10	3.19	1.78	1.82
Atlanta, Birmingham & Coast	2.23	2.25	1.82	1.85
Atlantic Coast Line	3.06	3.13	1.53	1.59
Central of Georgia	2.23	2.29	2.12	2.12
Charleston & Western Carolina	2.84	2.92	1.47	1.55
Cin., New Orleans & Texas Pac.	2.07	2.12	1.78	1.83
Clinchfield	1.51	1.58	1.51	1.58
Columbus & Greenville	2.60	2.64	1.50	1.50
Gulf, Mobile & Northern	2.08	2.31	1.44	1.60
Illinois Central System	2.02	2.16	1.81	1.95
Louisville & Nashville	1.80	1.85	1.80	1.85
Mobile & Ohio	2.04	2.17	2.04	2.17
Nashville, Chatt. & St. Louis	2.00	2.01	1.90	1.92
Norfolk Southern	3.38	3.49	1.35	1.43
Seaboard Air Line	2.80	2.97	1.42	1.53
Southern	1.69	1.80	1.63	1.74
Tennessee Central	1.79	1.84	1.79	1.80
Northwestern Region:				
Chicago & North Western	2.17	2.51	2.17	2.45
Chicago Great Western	2.77	2.88	1.61	1.71
Chi., Mil., St. P. & Pacific	2.39	2.60	2.33	2.55
Chi., St. P., Minneapolis & Omaha	4.17	4.52	3.88	4.32
Duluth & Iron Range	3.79	4.27	3.79	4.27
Duluth, Missabe & Northern	4.19	4.82	4.19	4.82
Duluth, South Shore & Atlantic	4.27	4.56	3.72	3.99
Great Northern	3.61	4.01	3.55	3.95
Green Bay & Western	4.83	5.03	4.83	5.03
Minneapolis & St. Louis	2.47	2.73	2.40	2.34
Minneapolis, St. Paul & S. S. Marie	3.86	4.21	3.35	3.66
Northern Pacific	2.68	2.90	2.68	2.90
Oregon-Wash. R. R. & Nav. Co.	3.68	3.62	2.24	2.37
Central Western Region:				
Atchison, Topeka & Santa Fe	2.96	3.08	2.88	2.98
Chicago & Alton	2.19	2.40	2.19	2.40
Chicago, Burlington & Quincy	2.17	2.41	2.13	2.37
Chicago, Rock Island & Pacific	2.50	2.84	2.33	2.56
Colorado & Southern	2.90	2.94	2.85	2.90
Denver & Rio Grande Western	2.05	2.20	2.04	2.19
Denver & Salt Lake	1.18	1.91	1.18	1.91
Fort Worth & Denver City	6.15	6.16	3.06	3.03
Oregon Short Line	3.18	3.17	2.60	2.81
Quincy, Omaha & Kansas City	2.66	2.77	2.61	2.77
Southern Pacific System	2.90	2.92	2.90	2.92
Toledo, Peoria & Western	2.71	2.86	1.30	1.55
Union Pacific	2.54	2.70	2.52	2.70
Utah	.82	1.00	.82	1.00
Western Pacific	3.18	3.32	1.90	2.07
Southwestern Region:				
Gulf, Colorado & Santa Fe		2.13		1.39
Kansas City Southern	2.70	3.02	2.68	3.00
Midland Valley	2.59	2.61	2.59	2.61
Missouri & North Arkansas	2.91	3.24	1.37	1.98
Missouri-Kansas-Texas Lines	3.04	3.16	2.67	2.85
Missouri Pacific	2.35	2.66	2.28	2.58
St. Louis-San Francisco	2.44	2.60	2.28	2.43
St. Louis Southwestern	3.21	2.42	2.34	1.53
Texas & Pacific		3.00		3.00

$18 to $23 for fir car sills and $18 to $22.50 for fir stringers.

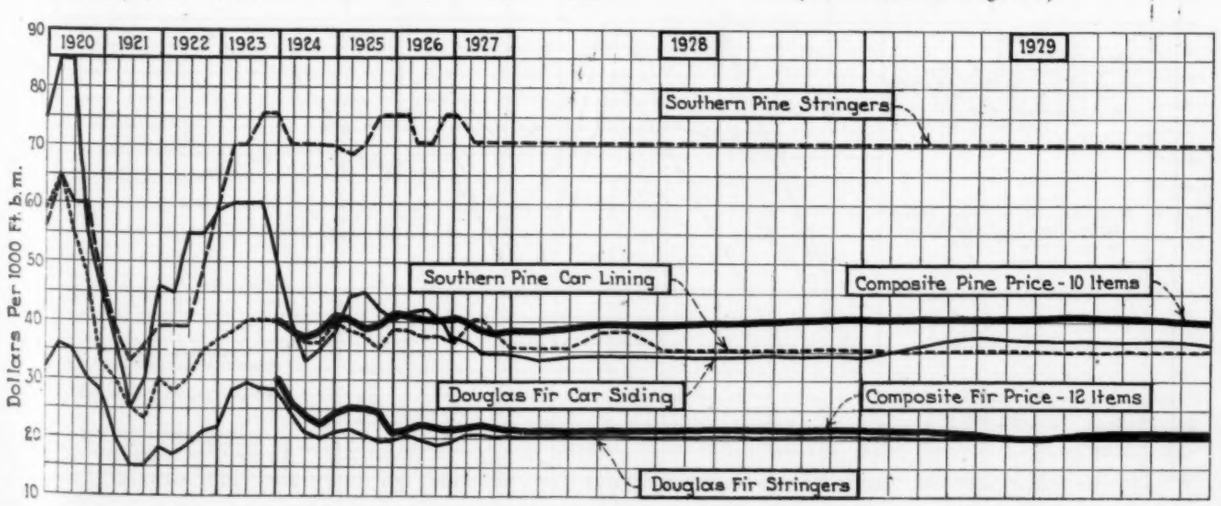
Tie Prices

Closing tie prices ranged from 67 cents to $1.16 each for fir of comparable sizes and grades, 48 cents to $1.20 for pine and 71 cents to $1.36 for white oak. Two developments in connection with tie production are worthy of note. First, railroads that follow the practice of gathering ties along their lines are being forced to an increasing degree to go farther back for their supplies and are correspondingly being faced with the necessity of offering higher prices to encourage production. Several roads paid slightly higher prices for some of their ties last year on that account. Another factor is the increasing degree to which railroads are adopting or adhering to uniform specifications and improving the grade of their purchases. This also has had its effect on prices in some sections. On the whole, however, tie prices, with the exception of those for hardwood ties, continued throughout last year on about the same level with those of the year previous. In the absence of emergencies forcing roads to promote production quickly at premium prices, prices will be the same or lower this year. Out of nine roads making reports on tie conditions, eight expect no change in prices, one road expects lower prices and none looks for advances. The forecast on tie buying stands: Six for the same quantities, none for more and three for smaller outlays.

Miscellaneous Materials Mixed

The miscellaneous materials purchased by the railroads comprise a large number which are made especially for railroad use and other materials which are common to the general market. Almost invariably, the prices of such materials are determined by conditions in the industries markets producing them rather than by the extent or practice of railway buying alone. The event last year was the substantial advance in the price of copper. The soaring price of copper also caused advances in the cost of a variety of locomotive specialties.

(*Continued on Page 98*)



Mill Price Variations of Lumber Items, 1920 to 1930

Railway Equipment Prices

Conference committee indexes show large increase in locomotive prices per pound—Car prices up slightly

By James G. Lyne
Financial Editor, *Railway Age*

THE latest detailed price averages for railway cars and locomotives, the compilation of the Eastern Group, Presidents' Conference Committee on Federal Valuation, are shown in the accompanying chart and table. The latest data given in this compilation are for the year 1928, with comparisons going back to 1910. The average prices shown are based on the selling price of the entire output (except for foreign use) of two large locomotive builders and six large car manufacturing concerns and are expressed in cents per pound, which obviates the disadvantage of having to compare the smaller equipment of some years ago with modern cars and locomotives with no allowance for varying size. An index number is also applied to each price figure, the index being based on the average price 1910-14 inclusive as 100.

The tabulation for 1928 shows a material increase in the price of locomotives in 1928, the index number being 252 as compared with 236 in 1927. The index 252, incidentally, is the highest on record since the compilation was started, with the single exception of 1920, when it reached 258. The index numbers of the prices of all-steel and composite freight cars also increased—only two points in each case, however—to 181 and 199 respectively. There was an important decline in the average per-pound price of passenger train cars, the index falling from 196 to 189.

The data available from which to measure comparative equipment prices in 1929 are not so complete as those compiled by the Presidents' Conference Committee for 1928 and preceding years. Prices for the year just past are readily available only by reference to the reports of the Bureau of Finance of the Interstate Commerce Commission on application by the railroads for authority to assume liability for equipment trust certificates. Railroads making such application are required, in most cases, to file a list of the equipment proposed to be purchased with the proceeds of the equipment trust issue and the price they propose to pay for each unit. In approving an application for an issue of these securities, the Bureau of Finance generally discloses these unit prices.

There is a definite danger, of course, in comparing these unit prices directly. The Interstate Commerce Commission's reports do not describe the equipment in any detail, and a fair comparison is possible only with a detailed knowledge of the characteristics of the equipment purchased. To overcome, in a measure, this deficiency the *Railway Age* takes the unit prices as shown by the Interstate Commerce Commission and endeavors to add thereto such descriptive details as are available. The commission may mention the purchase of a number of locomtives at a certain unit price. The *Railway Age* endeavors to adduce further the type and weight of these locomotives, their tractive force and to give the name of the builder and the date of the order, so that those interested may seek still further information if they require it. It is not always possible, however, to

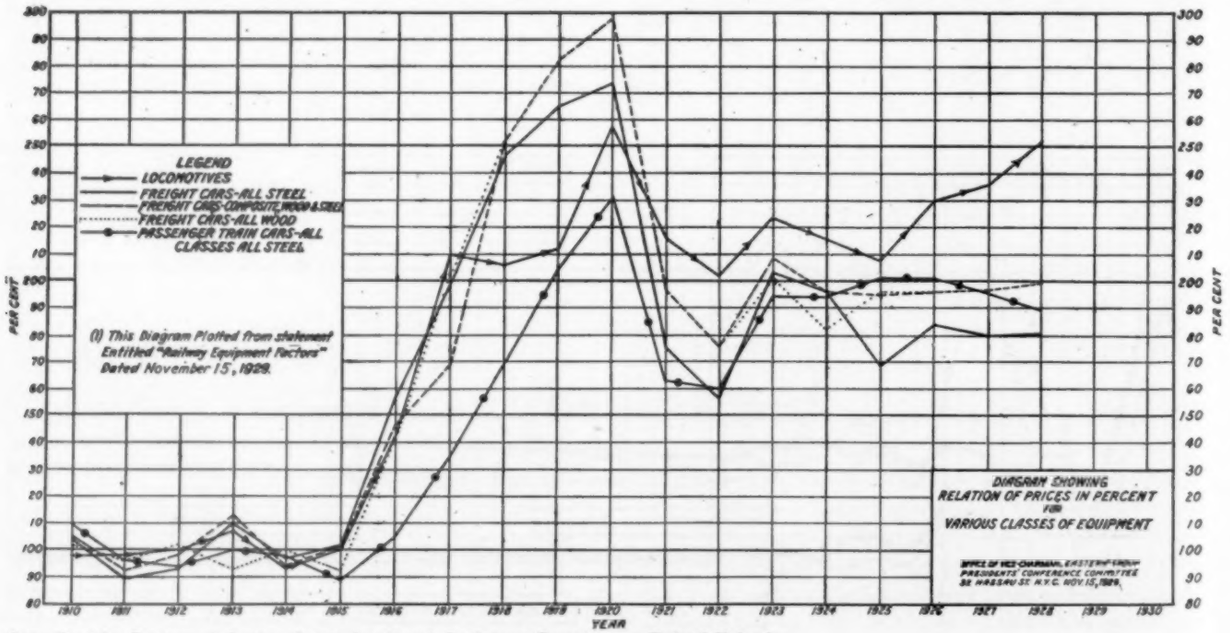

LEGEND
LOCOMOTIVES
FREIGHT CARS-ALL STEEL
FREIGHT CARS-COMPOSITE WOOD & STEEL
FREIGHT CARS-ALL WOOD
PASSENGER TRAIN CARS-ALL CLASSES ALL STEEL
(1) This Diagram Plotted from statement Entitled "Railway Equipment Factors" Dated November 15, 1929.
DIAGRAM SHOWING RELATION OF PRICES IN PERCENT FOR VARIOUS CLASSES OF EQUIPMENT
PER CENT
YEAR
1910 1911 1912 1913 1914 1915 1916 1917 1918 1919 1920 1921 1922 1923 1924 1925 1926 1927 1928 1929 1930

Chart Used by Courtesy of Eastern Group, Presidents' Conference Committee on Federal Valuation

Diagram Showing Relation of Prices in Per Cent for Varicus Classes of Equipment, 1910 to 1928

Railway Equipment Factors

STATEMENT SHOWING THE NUMBER OF UNITS SOLD, THE WEIGHTED AVERAGE PRICE PER POUND AS SOLD (EXCEPT WHERE ESTIMATED, SEE NOTE NO. 4) AND THE PER CENT OF INCREASE IN PRICE

Year or period	Locomotives			Freight Cars: All Steel			Freight Cars: Composite Wood and Steel			Freight Cars: All Wood			All Steel Passenger Train Cars (Steel underframe and all wood cars —See note 4-d)	
	No. of locos.	Price per lb.	Per cent	No. of cars	Price per lb.	Per cent	No. of cars	Price per lb.	Per cent	No. of cars	Price per lb.	Per cent	No. of cars	Per cent
1910-1914, incl. base	10,583	7.385c	100	71,108	2.57c	100	148,047	2.51c	100	53,349	2.26c	100	4,116	100
1910	2,901	7.265	98	10,455	2.68	104	18,555	2.63	105	13,739	2.30	102	799	109
1911	1,608	7.255	98	13,850	2.30	89	32,918	2.31	92	13,720	2.17	96	508	96
1912	3,269	7.350	100	17,803	2.39	93	46,348	2.47	98	17,665	2.31	102	821	94
1913	2,066	7.890	107	22,598	2.83	110	25,898	2.84	113	2,600	2.11	93	1,212	100
1914	739	6.873	93	6,402	2.49	97	24,328	2.37	94	5,625	2.25	100	776	98
1915	981	7.413	100	13,050	2.63	102	24,752	2.54	101	4,350	2.11	93	396	89
1916	2,170	10.542	143	21,307	4.01	156	14,650	3.67	146	12,396	3.19	141	687	105
1917	1,586	15.513	210	4,750	5.11	199	14,500	4.25	169	3,200	4.54	201	548	135
1918	1,976	15.225	206	12,383	6.36	247	43,000	6.35	253	None	*5.72*	*253*	16	169
1919	273	15.637	212	None	*6.82*	*265*	None	*7.09*	*282*	None	*6.37*	*282*	31	205
1920	1,458	19.074	258	13,480	7.03	274	12,950	7.47	298	None	*6.73*	*298*	553	231
1921	326	15.923	216	4,200	4.50	175	12,450	4.94	197	None	*4.45*	*197*	47	163
1922	1,910	14.924	202	32,181	4.00	156	51,597	4.39	175	None	*3.96*	*175*	1,182	160
1923	1,726	16.551	224	19,875	5.21	203	26,140	5.24	209	4,800	4.54	201	407	194
1924	1,109	15.919	216	46,433	5.05	196	26,300	4.92	196	3,795	4.12	182	862	194
1925	816	15.326	208	20,776	4.34	169	24,090	4.90	195	600	4.42	196	842	201
1926	960	16.999	230	6,825	4.73	184	15,146	4.93	196	None	*4.43*	*196*	697	201
1927	506	17.415	236	12,150	4.62	180	19,737	4.95	197	None	*4.45*	*197*	877	196
1928	383	18.637	252	10,200	4.66	181	11,735	4.99	199	None	*4.50*	*199*	431	189

NOTES—(1) The data on rolling equipment is based on the total selling price of the entire output of two large locomotive and six large car companies with certain sales excluded such as the Pershing locomotives and locomotives and cars sold to foreign countries.

(3) The price per pound is a weighted average composite price of all classes of equipment coming under each of the general headings.

(4) All prices and percentages shown in above table were determined from actual data furnished by the manufacturers with the exception of those underlined, which were estimated in the following manner:

(a) ALL STEEL FREIGHT CARS. COMPOSITE FREIGHT CARS—Price and percentage for 1919 were derived by interpolating between actual prices reported for 1918 and 1920 (1st 6 mos.).

(b) ALL WOOD FREIGHT CARS—The percentages for composite cars were used and from these percentages the price per pound was calculated, using the weighted average price of all wood freight cars for 1910 to 1914, incl., as base, or 100 per cent.

(c) ALL STEEL PASSENGER TRAIN CARS, FLOATING EQUIPMENT—Derived by interpolating between "Trend of Price" factors shown in Equipment Committee's reports (Passenger Train Car Report, dated June 1, 1921, and Supplements, and Floating Equipment Report, dated Dec. 30, 1920, and Supplements).

(d) WOOD WITH STEEL UNDERFRAME AND ALL WOOD PASSENGER TRAIN CARS—No sales reported (except eight for Steel Underframe) 1915 to 1928, incl. If sufficient wooden cars had been sold to make the market, it is felt that the the increase in price over the weighted average price 1910 to 1914, incl., would have been at least as great as that for all steel cars; therefore the percentage factors shown for all steel passenger train cars are recommended for application to the wood with steel underframe and all wood passenger train cars.

Office of Vice Chairman, Eastern Group, Presidents' Conference Committee.

identify equipment authorized in a given equipment trust decision with known orders for equipment. Hence the tabulation of equipment prices herein is by no means complete even as regards equipment purchases financed by the sale of equipment trust certificates. No price data are, of course, available for equipment financed by some method other than the issue of equipment trust certificates. It is not possible, then, to assume that the published prices give a fair picture of the price situation with regard to all equipment purchased.

If the figures are properly understood, however, and their limitations recognized, they may serve a valuable purpose. They are, for instance, the best information available thus early regarding price tendencies in 1929. A knowledge of current equipment costs is of prime concern to those interested in railroad valuation. In order

Locomotive Prices in 1929

(See Explanatory Note in Text)

Road	No.	Type	Weight	Tractive force	Builder	Unit price	Date of order	Equipment trust series
Boston & Maine	5	0-8-0	243,200	54,000	Baldwin	$41,717	February	No. 5
	5	Tenders	.....	.....	.....	15,759	.....	....
	4	2-8-4	403,000	69,400	Lima	104,009	February	No. 5
Chesapeake & Ohio	15	0-8-0	221,000	51,200	Baldwin	50,225	February	1929
Chicago & Illinois Western	2	0-8-0	221,700	51,041	Lima	48,026	February	....
Chicago & North Western	35	4-8-4	498,000	65,200	Baldwin	118,800	January	V and W
Chicago, Indianapolis & Louisville	10	2-8-2	335,000	69,000	American	65,080	September	E
Chicago, Mil., St. P. & Pacific	12	4-6-4	384,000	45,822	Baldwin	91,775	March	J
	2	4-6-4	384,000	45,822	Baldwin	93,525	March	J
	1	4-8-4	447,000	62,136	Baldwin	106,506	March	J
	2	Gas-Elec. Sw.	160,000	48,000	Whitcomb	60,000	April	J
Chicago, Rock Island & Pacific	5	4-8-2	378,000	50,430	American	77,190	April	P
	25	4-8-4	437,000	66,620	American	108,189	April	P
Erie	20	2-8-4	468,800	72,000	Lima	102,886	March	....
	15	0-8-0	236,280	57,210	Baldwin	55,363	March	....
	1	Oil-Elec.	228,000	64,000	Ing.-Rand-G. E.	112,000	June	....
	15	Tenders	.....	.....	.....	15,849	.....	....
Grand Trunk Western	12	0-8-0	215,150	49,690	Baldwin	42,860	May	1929
	3	4-6-2	299,330	40,700	Company Shops	68,750	May	1929
Illinois Central	15	0-8-0	221,700	51,041	Lima	48,026	February	P
	4	Elec. Switch.	200,000	50,000	Westinghouse	81,995	April	P
Missouri Pacific	15	0-8-0	.....	.....	Lima	50,384	1928	F
	10	0-8-0	.....	.....	Lima	50,391	1928	F
New York Central	100	4-8-2	.....	.....	American	86,000	1928	....
	25	4-8-2	.....	.....	American	85,150	.....	....
	10	4-6-4	.....	.....	American	88,800	.....	....
New York, Chicago & St. Louis	4	4-6-4	316,500	40,600	Lima	79,750	May	1929
New York, Ontario & Western	10	4-8-2	363,000	.....	American	88,110	March	....
Southern Pacific	10	4-8-2	368,000	57,510	Company Shops	84,155	April	L
	16	4-8-8-2	622,600	112,760	Baldwin	133,770	March	L
	20	Tenders	.....	.....	Company Shops	14,897	April	L
Western Pacific	5	2-8-2	335,000	.....	American	78,992	March	D

Freight Car Prices in 1929

(See Explanatory Note in Text)

Road	No.	Type	Capacity	Construction	Builder	Unit price	Date of order	Equipment trust series
Baltimore & Ohio	1,000	Gondola	140,000	Steel	Amer. Car & Fdy.	$2,429	May	F
	1,000	Gondola	140,000	Steel	Bethlehem	2,429	May	F
	1,000	Hopper	140,000	Steel	Standard Steel	2,372	May	F
	1,000	Hopper	140,000	Steel	Bethlehem	2,373	May	F
	3,500	Box	100,000	Steel	Standard Steel	1,988	April-August	F
Boston & Maine	500	Hopper	140,000	Steel	Standard Steel	2,297	October	No. 5
Central Vermont	500	Auto	80,000	Steel	Pressed Steel	2,495	November '28	1929
	500	Auto	80,000	Steel Frame	Pullman	2,439	April	1929
Chesapeake & Ohio	125	Caboose	.....	Steel Frame	Company Shops	2,459	February	1929
	500	Vent. Box	80,000	Steel Frame	Pressed Steel	2,481	February	1929
	1,500	Gondola	100,000	Steel	Amer. Car & Fdy.	2,141	February	1929
	500	Gondola	100,000	Steel	Richmond Car	2,141	February	1929
Chicago & Illinois Western	100	Gondola	100,000	Steel Frame	Ryan	2,615	February	....
	100	Hopper	140,000	Steel	Gen. Amer. Car.	2,476	February	....
Chicago & Northwestern	300	Flat	100,000	Steel Frame	Am. Car & Fdy.	1,723	October	V and W
	400	Gondola	.....	Steel Frame	.....	2,298	.....	V and W
	200	Ballast	.....	Steel	.....	2,291	.....	V and W
	500	Auto	80,000	Steel Frame	Pullman & Gen. Amer. Car	2,586	January	V and W
	500	Auto	80,000	Steel Frame		2,430	January	V and W
	500	Gondola	140,000	Steel Frame	Pullman	2,150	January	V and W
	500	Gondola	140,000	Steel Frame	Standard Steel	2,150	January	V and W
Chicago, Mil., St. P. & Pacific	1,000	Auto	100,000	St. Und'frame	Bettendorf	2,535	March	J
	200	Auto	100,000	St. Und'frame	Pacific Car & Fdy.	2,535	March	J
	500	Auto	100,000	St. Und'frame	Pullman	2,767	March	J
	800	Ballast	140,000	Steel	Gen. Amer. Car.	2,653	March	J
	200	Ballast	140,000	Steel	Gen. Amer. Car.	2,558	March	J
	500	S. D. Stock	80,000	Steel	Standard Steel	1,919	March	J
	150	D. D. Stock	80,000	Steel	Standard Steel	2,022	March	J
	350	Flat	100,000	St. Und'frame	Ryan	1,723	March	J
	150	Flat	100,000	St. Und'frame	Pressed Steel	1,815	March	J
	171	Ore	140,000	Steel	Pressed Steel	2,121	March	J
Chicago, Rock Island & Pacific	1,000	S. S. Box	100,000	Steel Frame	Am. Car & Fdy.	2,270	January	P
	1,000	Gondola	140,000	Steel Frame	Pressed Steel	2,665	January	P
	250	Ballast	140,000	Steel	Standard Steel	2,755	January	P
	250	Flat	100,000	St. Und'frame	Ryan	1,685	January	P
Chicago, St. Paul, Minneap. & Omaha	250	Stock	.....	St. Und'frame	Pullman	1,837	June '28	G
	200	Gondola	.....	Steel	Pullman	2,363	June '28	G
Columbus & Greenville	300	S. S. Box	80,000	St. Und'frame	Amer. Car & Fdy.	1,900	June	A
Erie	500	Box	100,000	Steel	Gen. Amer. Car.	2,327	1929	....
	500	Auto Box	80,000	Steel	Amer. Car & Fdy.	2,525	1929	....
	1,000	Hopper	140,000	Steel	Standard Steel	2,433	1929	....
	250	Gondola	140,000	Steel	Greenville Steel	2,359	1929	....
	250	Gondola	140,000	Steel	Bethlehem	2,386	1929	....
	25	Caboose	.....	Steel	Magor	3,428	1929	....
Grand Trunk Western	500	Auto	80,000	Steel	Pressed Steel	2,495	November '28	1929
	500	Auto	80,000	Steel Frame	Pullman	2,439	April	1929
	1,000	Auto	80,000	Steel Frame	Pressed Steel	2,465	April	1929
Illinois Central	600	Auto-Furn.	80,000	Steel Frame	Amer. Car & Fdy.	2,476	February	P
	100	Auto-Furn.	80,000	Steel Frame	Amer. Car & Fdy.	2,679	February	P
	250	Auto-Furn.	80,000	Steel Frame	Mt. Vernon Car.	2,817	February	P
	50	Auto-Furn.	80,000	Steel Frame	Mt. Vernon Car.	3,053	February	P
	325	Hopper	140,000	Steel	Gen. Amer. Car.	2,476	February	P
	425	Hopper	140,000	Steel	Standard Steel	2,465	February	P
	750	Hopper	100,000	Steel	Pullman	2,097	February	P
	200	Flat	100,000	Steel Frame	Bettendorf	2,031	February	P
	25	Caboose	.....	St. Und'frame	Amer. Car & Fdy.	3,040	February	P
Maine Central	1,000	Box	100,000	Steel	Standard Steel	2,173	February	....
Missouri Pacific	100	Auto	100,000	Steel Frame	Mt. Vernon Car.	2,914	January	F
	150	Auto	100,000	Steel Frame	Mt. Vernon Car.	2,729	January	F
	250	Auto	80,000	Steel Frame	Mt. Vernon Car.	2,491	January	F
	500	Auto	80,000	Steel Frame	Mt. Vernon Car	2,321	January	F
	500	Auto	80,000	Steel Frame	and	2,302	and	F
	500	Auto	80,000	Steel Frame	Am. Car & Fdy.	2,294	February	F
	500	Stock	80,000	Steel Frame	Gen. Amer. Car.	1,935	January	F
	500	Box	100,000	Steel Frame	Am. Car & Fdy.	2,312	January	F
	500	Box	100,000	Steel Frame	Am. Car & Fdy.	2,312	January	F
	300	Hopper	140,000	Steel	.....	2,501	January	F
	100	Hopper	140,000	Steel	Standard Steel	2,475	January	F
	100	Hopper	140,000	Steel	.....	2,412	January	F
	60	Caboose	.....	St. Und'frame	Am. Car & Fdy.	2,886	January	F
	20	Dump	.....	.....	Western Wh. Scraper	3,300	January	F
New York Central	1,000	Box	110,000	Steel	Am. Car & Fdy.	2,144	March	....
	500	Box	110,000	Steel	Merch. Despatch	2,145	March	....
	700	Auto-Box	110,000	Steel	Merch. Despatch	2,512	March	....
	790	Gondola	140,000	Steel	Pressed Steel	2,132	March	....
	500	Gondola	140,000	Steel	Merch. Despatch	2,114	March	....
	250	Gondola	140,000	Steel	Gen. Amer. Car.	2,111	March	....
	500	Hopper	140,000	Steel	Standard Steel	2,159	March	....
	300	Flat	110,000	Steel	Company Shops	1,362	March	....
New York, Chicago & St. Louis	250	Gondola	110,000	Steel	Am. Car & Fdy.	2,304	May	1929
	350	Auto-Box	80,000	Steel	Standard Steel	2,786	May	1929
	150	Auto-Box	80,000	Steel	Standard Steel	2,954	May	1929
New York, New Haven & Hartford	95	Caboose	.....	St. Und'frame	Company Shops	2,380	1928	....
Southern	1,500	Hopper	110,000	Steel	Pressed Steel	1,660	October	CC
	1,000	Auto-Furn.	80,000	Steel Frame	Am. Car & Fdy.	2,150	October	CC
Southern Pacific	247	Flat	100,000	St. Und'frame	Company Shops	1,927	April	L
	65	Gondola	100,000	Steel	Company Shops	2,504	March	L
	300	Logging	80,000	Steel	Company Shops	1,376	May	L
	50	Caboose	60,000	Steel Frame	Company Shops	3,060	March	L
	2	Caboose	60,000	Steel Frame	Company Shops	3,362	March	L
	20	Air-Dump	30 cu. yd.	Steel	Magor	4,039	March	L
Texas & Pacific	525	Auto-Box	80,000	Steel Frame	Pressed Steel	2,447	March	C
	175	Auto-Box	80,000	Steel Frame	Pressed Steel	2,628	March	C
	250	Auto	100,000	St. Und'frame	Am. Car & Fdy.	2,834	March	C
	50	Auto	100,000	St. Und'frame	Am. Car & Fdy.	3,019	March	C
	500	Stock	80,000	St. Und'frame	Pullman	1,977	1929	C
Wabash	700	Auto	80,000	St. Und'frame	Am. Car & Fdy.	2,233	1928	H
	500	Auto	80,000	St. Und'frame	Am. Car & Fdy.	2,208	1928	H
	300	Auto	80,000	St. Und'frame	Am. Car & Fdy.	2,453	1928	H
	500	Auto	.....	.....	Pullman	2,207	1928	H

Road	No.	Type	Capacity	Construction	Builder	Unit price	Date of order	Equipment trust series
Western Pacific	50	Flat	100,000	St. Und'frame	Pac. Car & Fdy.	1,924	February	D
	50	Tank	12,500 gal.	Steel	Gen. Amer. Tank	2,473	February	D
	150	S. S. Auto	100,000	St. Und'frame	Pullman	2,959	February	D
	100	S. S. Auto	100.000	St. Und'frame	Pullman	3,109	February	D

Passenger Car Prices in 1929*

(See Explanatory Note in Text)

Road	No.	Class	Length	Weight	Builder	Unit price	Date of order	Equipment trust series
Baltimore & Ohio	50	Coach	78 8¾	153,900	Pullman	$32,150	November	F
Boston & Maine	10	Bagg.-Mail	63 3	102,000	Osgood Bradley	22,001	January	No. 5
Chesapeake & Ohio	12	Express	70 8¼	129,000	Pullman	19,670	March	1929
Chicago & North Western	10	Baggage	73 8	137,000	Am. Car & Fdy.	19,600	January	V and W
Chicago, Mil., St. Paul & Pacific	2	Mail-Bagg. Steam Motor	.....	120,700	Ry. Loco.-Int. Har.	49,347	.....	J
Chicago, Rock Island & Pacific	4	Parlor-Obser.-Lounge	80 6	165,000	Pullman	58,814	1928	P
	6	Bagg.-Mail	70 0	140,700	Am. Car & Fdy.	22,472	1928	P
	10	Baggage	70 0	134,200	Am. Car & Fdy.	19,166	1928	P
	5	Baggage	70 0	135,400	Am. Car & Fdy.	19,100	January	P
	10	Coach	74 6	145,500	Pullman	28,315	1928	P
	3	Gas-Elec. Rail Motor	.....	109,000	Cummings-Mack	47,382	1928	P
	8	Gas-Elec. Rail Motor	.....	109,000	St. Louis Car-Elect.-Mo.	47,406	1928	P
	10	Suburban	70 0	96,500	Standard Steel	20,592	1928	P
	15	Suburban	70 0	95,300	Standard Steel	20,480	January	P
	5	Dining	80 6	175,100	Pullman	51,295	January	P
	2	Parlor	76 7½	156,000	Pullman	43,050	January	P
	5	Horse Exp.	74 2	147,000	Am. Car & Fdy.	23,631	1928	P
	5	Gas-Elec. Rail Motor	.....	.....	.....	53,566	1929	P
	7	Gas-Elec. Rail Motor	.....	179,000	St. Louis-Elec.-Mo.G. E.	89,740	1929	P
Erie	30	Suburban	75 9	103,800	Standard Steel	19,060	April	....
	10	Bagg.-Exp.	70 0	130,300	Pullman	21,041	1929	....
Illinois Central	6	Bagg.-Mail	70 9	139,600	St. Louis Car	24,603	March	P
	5	Bagg.-Exp.	70 9	133,800	St. Louis Car	20,207	March	P
	5	Horse	70 9	135,800	St. Louis Car	23,735	March	P
	10	Coach	72 0	137,800	Am. Car & Fdy.	28,860	March	P
	8	Chair	70 0	141,500	Am. Car & Fdy.	29,852	March	P
	10	Suburban Motor	60 6	141,200	Pullman	54,706	1928	P
	10	Suburban Trailer	60 6	88,600	Pullman	31,248	1928	P
Missouri Pacific	2	Dining-Obs.	79 10	159,400	Am. Car & Fdy.	50,199	January	F
	1	Cafe-Club	78 11¼	154,000	Am. Car & Fdy.	48,457	January	F
	11	Coach	79 1	151,100	Am. Car & Fdy.	29,430	January	F
	13	Baggage	73 10	138,600	Am. Car & Fdy.	18,873	January	F
	11	Bagg.-Mail	73 10	159,400	St. Louis Car	23,146	January	F
	2	Bagg.-Mail	73 10	154,000	St. Louis Car	23,726	January	F
New York Central	10	Pass.-Bagg.	74 11¼	126,700	Pressed Steel	27,510	April	....
	20	Baggage	73 0¾	141,100	Am. Car & Fdy.	21,317	April	....
	30	Milk	52 3½	84,800	Merch. Despatch	8,016	April	....
New York, Chicago & St. Louis	8	Coach	76 11½	134,800	Pullman	32,521	May	1929
	2	Cafe	83 11½	178,000	Pullman	48,285	May	1929
	3	Dining	80 8	168,000	Pullman	54,632	May	1929
	5	Baggage	63 11¾	108,000	Pullman	20,279	May	1929
	3	Baggage	73 8¾	128,000	Pullman	22,810	May	1929
Southern Pacific	15	Chair	82 5½	158,000	Pullman	33,055	May	L
	25	Dining	80 5½	160,500	Pullman	50,937	1928	L
	10	Lounge	83 6	175,000	Pullman	55,588	February	L
	3	Observ.	83 6	150,000	Pullman	38,825	February	L
	2	Gas-Elec. Rail Motor	.....	.....	Brill-Hall-Scott-West.	51,000	.....	L
	1	Gas-Elec. Rail Motor	.....	.....	Cummings-Mack	43,500	.....	L
	1	Gas-Elec. Rail Motor	.....	.....	Beth.-Elec.-Mo.	51,500	.....	L
	2	Gas-Elec. Rail Motor	.....	.....	Pullm.-Elec.-Mo.-West.	45,341	.....	L
	6	Gas-Elec. Rail Motor	.....	.....	St. Steel-Sterling-West.	56,922	1928 and	L
	1	Gas-Elec. Rail Motor	.....	.....	Pullman-Elec.-Mo.	65,500	1929	L
	1	Gas-Elec. Rail Motor	.....	.....	Pull-m.Elec.-Mo.-G. E.	60,972	.....	L
	6	Gas-Elec. Rail Motor	.....	.....	.....	59,159	.....	L
	2	Gas-Elec. Rail Motor	.....	.....	.....	73,095	.....	L
	5	Gas-Elec. Rail Motor	.....	.....	.....	74,598	.....	L

* Including Rail Motor Cars.

that the public may be accurately informed regarding railroad activity, accurate and up-to-date knowledge of the cost of modern equipment is one of the items of preparation essential to every spokesman for the railways, regardless of what his official position may be. The information is also of considerable importance to all students of railway problems and tendencies—not only those of today but those of the future.

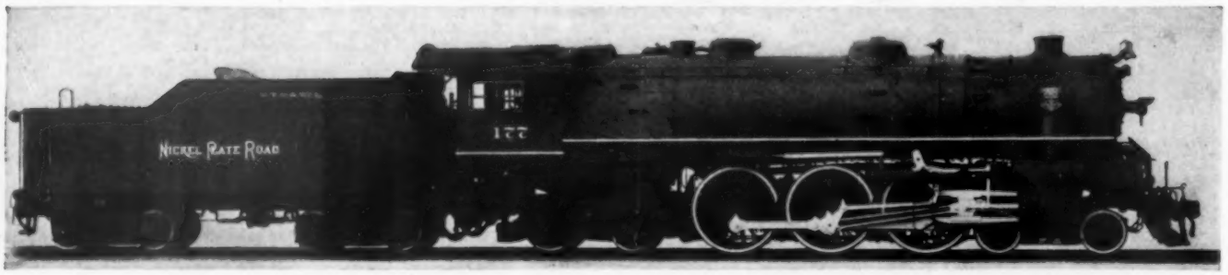
The *Railway Age*, then, believes that the information properly understood can serve a useful purpose and, with an added note of explanation of the limitations and proper use of these price data, proceeds to list them.

Explanatory Note.—Items are given in some descriptive detail so that the varying prices may be reconciled with the different sizes and characteristics of the equipment. It is, of course, impossible to list all the variations, even if the information were available, and some cases will probably be found where equipment of approximately the same published characteristics may be found to be differently priced on different orders. The explanation lies usually in some variation in characteristics which is not mentioned in the tabulation.

Thus, for instance, in the case of two dining cars of approximately the same weight and seating capacity ordered by different railroads at approximately the same time, there might be a material difference in the unit prices. The explanation of this variation might well be a difference in the richness of furnishings or in the elaborateness of kitchen equipment, which contrast would not be shown in the published data.

* * *

Chicago, Rock Island & Pacific Yards at Haileyville, Okla.



Nickel Plate 4-6-4 Type Built by Lima Locomotive Works, Inc.

Locomotives Ordered in 1929

Total, more than double that of 1928 and materially greater than 1927, is still far from record-breaking—Canadian and export orders high

By Walter J. Taft
Associate Editor, *Railway Age*

LOCOMOTIVES ordered for domestic service in the United States during 1929 totaled 1,212, or more than twice the 603 ordered in 1928. Despite this, however, and the additional fact that orders were also substantially in excess of those in 1927, 1929 is nevertheless one of the seven lowest years, so far as total orders are concerned, which has been seen since 1901. Modern locomotives are, of course, far more powerful and far more costly that those of the days when yearly orders totaled thousands. This 1929 total of 1,212 brings the yearly locomotive orders over the one thousand mark for the first time since 1926 when 1,301 were ordered. The years since 1901 when fewer orders were placed than last year were 1908, 1919, 1921, 1925, 1927 and 1928.

Table I—Locomotive Orders in 1929

For service in the United States	1,212
For service in Canada	77
For export to other countries	106
Grand total	1,395

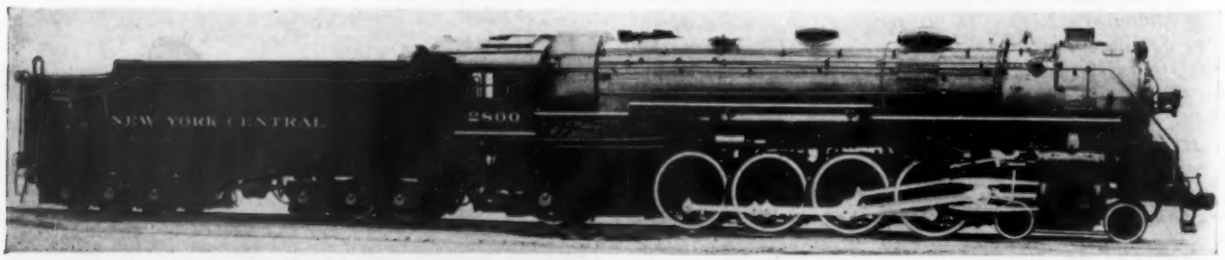
Orders placed by Canadian roads with builders in that country during 1929 totaled 77, or 21 less than the comparable 1928 figure. With the exception of 1928, however, which was the eight-year peak in these Canadian orders, 1929 was the best year since 1923. Orders placed in Canada in this latter year totaled 82.

Export orders were about four times the 1928 total and involved the purchase of 106 locomotives. This also is practically twice the 1927 total but in 1926 180 locomotives were ordered in this country for export.

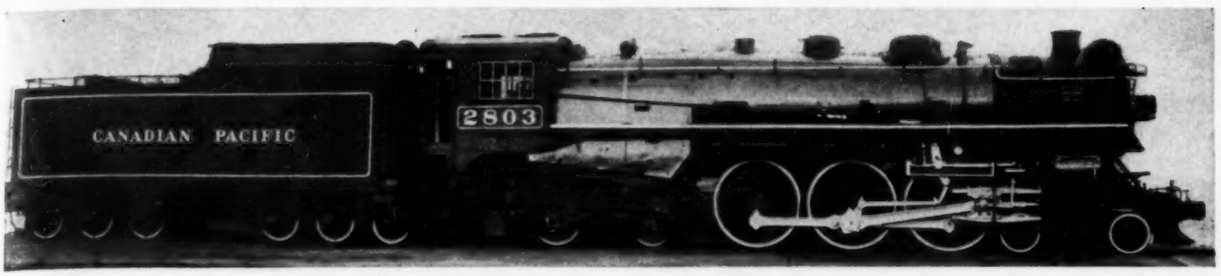
Locomotives built in 1929 for service in the United States and Canada, as distinguished from those ordered during the past year, totaled 1,022, compared with a 1928 figure of 636. Of this 1929 total 926 locomotives were built in the United States and 96 in Canada. Prior to the present year the accompanying tabulation did not segregate these Canadian and United States production figures. This distribution, first made in the current compilation will be continued in future issues, and thus the locomotive tabulation will be on the same basis as are those of freight cars and passenger cars produced.

This distinction between locomotives ordered and the number built should be emphasized. A locomotive is under construction for several months and thus locomotive production figures for any year naturally include some units which were ordered during the closing months of the year previous to that under review. It is this overlap from year to year that results in a total production figure different from the total ordered.

The Car Service Division of the American Railway Association reports monthly totals of locomotive installations and retirements. These figures will not agree with the *Railway Age* totals of locomotives or-

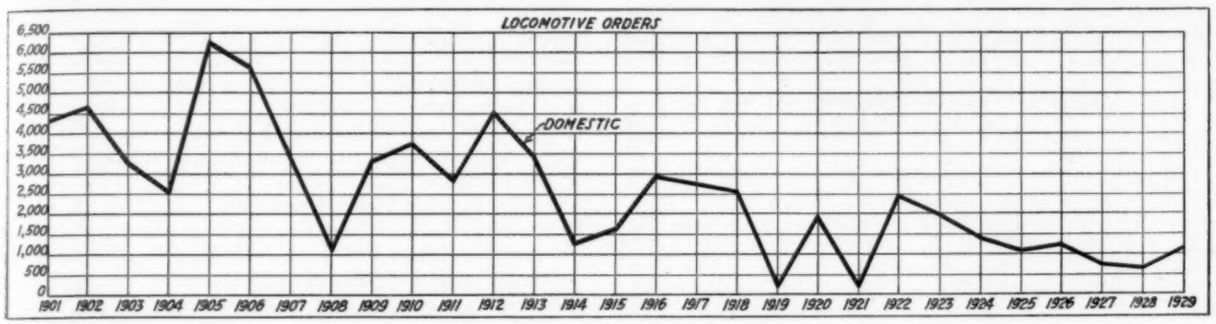


New York Central 4-8-2 Type Built by American Locomotive Company



Canadian Pacific 4-6-4 Type Built by Montreal Locomotive Works, Inc.

dered or built. This follows because the Car Service Division total covers only Class I carriers, whereas the *Railway Age* figures cover all carriers, and also because the Car Service Division's report, includes, under installations, locomotives leased from other roads or rebuilt locomotives.



Locomotive Orders, 1901 to 1929

Table II—Orders for Locomotives Since 1901

Domestic Orders Only

Year	Locomotives	Year	Locomotives
1901	4,340	1908	1,182
1902	4,665	1909	3,350
1903	3,283	1910	3,787
1904	2,538	1911	2,850
1905	6,265	1912	4,515
1906	5,642	1913	3,467
1907	3,482	1914	1,265

Domestic and Foreign

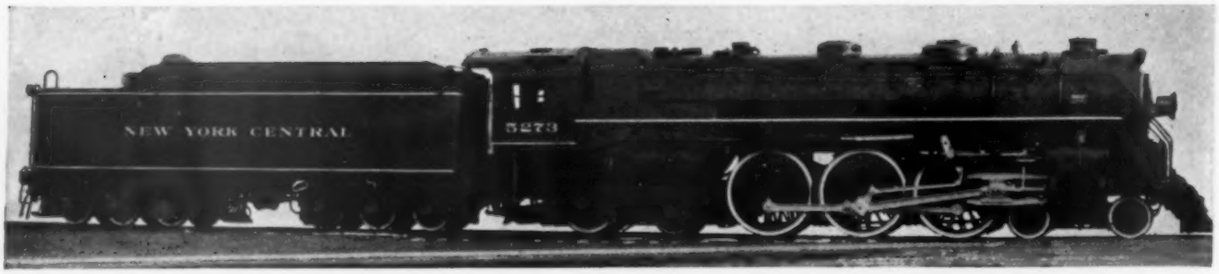
Year	Domestic	Canadian	Export	Total
1915	1,612	...	850	2,462
1916	2,910	...	2,983	5,893
1917	2,704	...	3,438	6,142
1918	2,593	209	2,086	4,888
1919	214	58	898	1,170
1920	1,998	189	718	2,905
1921	239	35	546	820
1922	2,600	68	131	2,799
1923	1,944	82	116	2,142
1924	1,413	71	142	1,626
1925	1,055	10	209	1,274
1926	1,301	61	180	1,542
1927	734	58	54	846
1928	603	98	27	728
1929	1,212	77	106	1,395

Prior to 1918, Canadian orders included under "Domestic."

In an article similar to this published in the Annual Statistical Number of the *Railway Age* a year ago some consideration was given to the causes for the decline in orders in 1927 and 1928. Statistics of locomotive ownership and serviceable locomotives stored were quoted to show that because of the advances in locomotive effectiveness and equipment utilization the serviceable locomotives in storage of late years had become an adequate motive power reserve. It was suggested however, that with the emphasis on efficiency in railway operation, the motive of securing greater operating economy would soon become more compelling; and that after the drastically curtailed purchases of 1927 and 1928, the year 1929 would witness an up-turn in locomotive orders. This latter prediction has been fulfilled.

It might further be suggested that during 1923 and 1924 the number of locomotives installed ran substantially ahead of those retired and those ordered. This indicates that a rebuilding program was being carried on and that many of the locomotives retired were being reinstated after rehabilitation. Following 1924, however, the figures for locomotives installed commenced to fall substantially below the figures for locomotives retired and more nearly to approach the figures of locomotives ordered. The inference here is that the heavy rebuilding and reinstating of retired locomotives is drawing to an end and that in the future the main source of installation will be new locomotives.

Chicago, Burlington & Quincy 2-10-4 Type Built by Baldwin Locomotive Works



New York Central 4-6-4 Type Built by American Locomotive Company

During the year the New York Central Lines ordered more locomotives than any other company, its orders totaling 179 steam locomotives for service on the various lines of its system and 35 oil-electric and 42 electric locomotives for use on its New York City West Side lines. Four other oil-electric locomotives were purchased for service on the Michigan Central, thus bringing the total oil-electric locomotives ordered by the New York Central Lines to 39. This same company was also the largest 1928 purchaser, having bought 165 locomotives during that year. Next among the large locomotive buyers in 1929 was the Pennsylvania, which purchased 100. Other large orders were: Those of the Chicago, Rock Island & Pacific, totaling 69; the Southern Pacific, 65; the Wabash, 50; the Great Northern, 45; the Chicago, Burlington & Quincy, 41. The Canadian National ordered 41 and the Canadian Pacific 31 of the Canadian total.

The following closing paragraph, quoted from the 1928 Annual Statistical Number, applies with equal force to the current review of locomotive orders:

"In the appended list of locomotive orders some few omissions of small orders doubtless occur. The details presented were supplied by railways and other purchasers of locomotives in response to inquiries from the *Railway Age*. They were checked against similar lists furnished through the co-operation of the builders, and amplified by reference to the weekly reports in the Equipment and Supplies column of the *Railway Age*. Because of the short time available for the compilation and the haste necessary to insure publication so soon after the end of the year, the *Railway Age* does not desire to make any claims as to the scientifically statistical accuracy of the tables or totals drawn from them. However, the real purpose of the statistics is to allow comparisons of the year's business with that of other years, which purpose it is hoped they meet with entire adequacy."

Table III—Locomotives Built in 1929

	United States	Canada	Total
Domestic	926	96	1,022
Foreign	139	..	139
Total	1,065	96	1,161

Comparison with Previous Years

Year	Domestic	Foreign	Total	Year	Domestic	Foreign	Total
1896.....	866	309	1,176	1912†....	4,403	512	4,915
1897.....	865	386	1,251	1913†....	4,561	771	5,332
1898.....	1,321	554	1,875	1914†....	1,962	273	2,235
1899.....	1,951	514	2,475	1915†....	1,250	835	2,035
1900.....	2,648	505	3,153	1916†....	2,708	1,367	4,075
1901.....	....	....	3,384	1917†....	2,585	2,861	5,446
1902.....	....	....	4,070	1918†....	3,668	2,807	6,475
1903.....	....	....	5,152	1919†....	2,162	1,110	3,272
1904.....	....	....	3,441	1920†....	2,022	1,650	3,672
1905*....	4,896	595	5,491	1921†....	1,185	638	1,823
1906*....	6,232	720	6,952	1922†....	1,303	231	1,534
1907*....	6,564	798	7,362	1923†....	3,505	280	3,795
1908*....	1,886	456	2,342	1924†....	1,810	226	2,036
1909*....	2,596	291	2,887	1925†....	994	291	1,285
1910*....	4,441	314	4,755	1926†....	1,585	185	1,770
1911*....	3,143	387	3,530	1927†....	1,009	167	1,176
				1928†....	636	111	747

* Includes Canadian output.
† Includes Canadian output and equipment built in railroad shops.

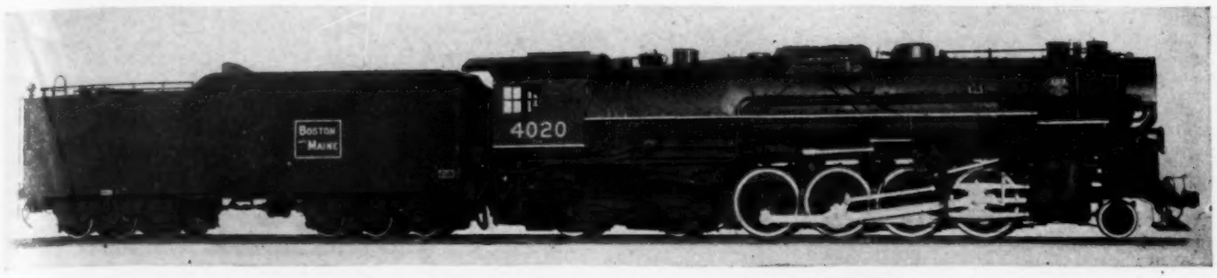
	United States			Canada			Grand
	Domestic	Foreign	Total	Domestic	Foreign	Total	total
1929	926	139	1,065	96	....	96	1,161

Locomotive Orders in 1929

For Service in the United States

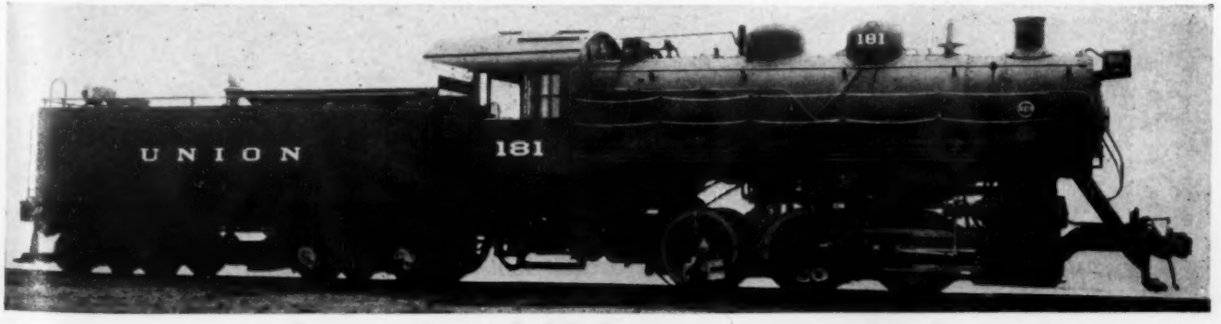
Purchaser	No.	Type	Service	Weight	Tractive force	Cylinders	Date of order	Date of delivery	Builder
Alabama, Tennessee & Northern	1	2-10-0	Freight	214,300	49,000	24 x 28	Dec. '28	April	Baldwin
American Bridge Co.	1	.....	Sw.	.....	.....	.....	December	.....	Baldwin
Atchison, Topeka & S. Fe	1	2-10-4	.....	.....	.....	.....	December	.....	Baldwin
Atlantic Gypsum P. Co.	1	Geared	.....	79,000	18,970	12 x 13	1929	1929	Heisler
Bangor & Aroostook	4	4-8-2	Freight	303,000	60,200	22½ x 30	August	November	American
Belt Railway of Chicago	5	0-8-0	Sw.	258,000	63,600	27 x 30	December	Feb. '30	Baldwin
Bessemer & Lake Erie	1	2-10-4	Freight	502,630	96,700	31 x 32	April	July	Baldwin

Eight-Wheel Switcher Built by Baldwin Locomotive Works

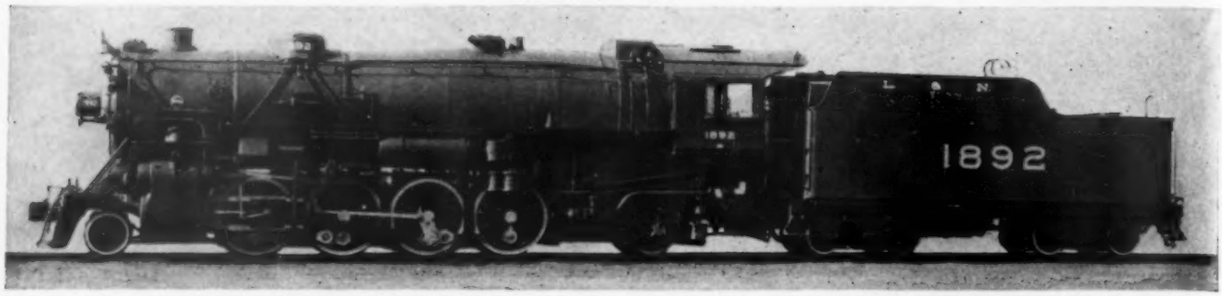


Boston & Maine 2-8-4 Type Built by Lima Locomotive Works, Inc.

Purchaser	No.	Type	Service	Weight	Tractive force	Cylinders	Date of order	Date of delivery	Builder
Bethlehem Steel Co	2	0-4-0	Sw.	130,000	30,500	19 x 22	October	.....	Baldwin
Boston & Maine	5	0-8-0	Sw.	243,200	54,000	23 x 28	February	July	Baldwin
	4	2-8-4	Freight	403,000	69,400	28 x 30	February	September	Lima
	1	2-8-4	Freight	405,000	69,400	28 x 30	February	September	Lima
Bostonia C. & C. Prod. Co	1	Geared	.....	200,000	38,880	16 x 18¼	1929	1929	Heisler
Brown Co	1	2-6-2	Sw.	164,200	31,000	19 x 24	March	.....	Baldwin
Byers Co., A. M	1	0-6-0	Sw.	164,000	35,100	21 x 26	April	August	American
Calumet & Hecla C. Copper Co	1	2-6-0	Freight	165,500	35,400	20 x 26	May	September	American
	1	0-6-0	Sw.	141,200	34,400	21 x 26	May	September	Baldwin
Canton & Carthage	1	2-8-2	Freight	177,000	34,000	20 x 28	October	Jan. '30	American
Central of New Jersey	5	0-8-0	Sw.	262,800	64,093	24 x 30	March	November	Baldwin
Chesapeake & Ohio	15	0-8-0	Sw.	221,000	51,200	25 x 28	February	August	Baldwin
Chicago & Illinois Midland	2	2-10-2	Freight	360,300	80,500	27 x 32	April	November	Baldwin
Chicago & Illinois Western	2	0-8-0	Sw.	221,700	51,041	25 x 28	February	June	Lima
Chicago & North Western	35	4-8-4	Pass.	498,000	65,200	27 x 32	January	November	Baldwin
Chicago, Burlington & Quincy	1	0-8-0	Sw.	261,400	61,400	27 x 30	December	1930	Company Shops
	20	0-6-0	Sw.	185,200	44,300	22 x 28	December	1930	Company Shops
	12	4-6-4	.....	.....	.....	.....	December	.....	Baldwin
	8	4-8-4	.....	.....	.....	.....	December	.....	Baldwin
Chicago Great Western	15	2-10-4	.....	.....	.....	.....	December	.....	Lima
Chicago, Indianapolis & Louisville	10	2-8-2	Freight	335,000	69,000	27 x 32	September	November	American
Chic., Milwaukee, St. P. & Pac	14	4-6-4	Pass.	384,000	45,822	26 x 28	March	December	Baldwin
	1	4-8-4	Pass.	447,000	62,136	28 x 30	March	December	Baldwin
Chicago, Rock Island & Pacific	24	4-8-4	Freight	437,000	66,620	26 x 32	April	July-Sept.	American
	5	4-8-2	Pass.	378,000	50,430	28 x 28	April	Sept.-Oct.	American
	40	4-8-4	.....	434,000	.....	26 x 32	November	.....	American
Citizens Gas Co	1	2-6-2		170,000	.....	19 x 24	.....	.....	American
Cleveland, Cinn., Chi. & St. L	25	4-8-2	Freight	.....	.....	.....	June	.....	American
	20	4-6-4	Pass.	.....	.....	.....	June	.....	American
Coos Bay Lumber Co	1	2-8-2	.....	190,000	.....	20 x 24	.....	.....	American
Crossett Western	1	2-8-2		168,000		18 x 24		.....	American
Crown Willamette Paper Co	1	2-6-6-2	Freight	221,500	37,500	17&26x24	February	.....	Baldwin
Delaware & Hudson	1	2-8-0	Freight	257,000	70,300	20½&35½x32	June	Feb. '30	American
	1	4-6-2	Pass.	283,300	41,600	22 x 28	.....	April	Company Shops
	1	4-6-2	Pass.	283,300	41,600	22 x 28	.....	December	Company Shops
	4	2-8-0	Freight	298,000	68,500	25 x 32	.....	Feb.-Nov.	Company Shops
Denver & Rio Grande Western	4	4-8-4	Pass.	498,400	61,000	27 x 30	April	July	Baldwin
East Jersey Railroad & Terminal	1	0-6-0	Freight	136,000	27,200	19 x 24	August	October	Baldwin
Elgin, Joliet & Eastern	6	2-8-2	Freight	333,650	58,705	28 x 30	May	November	Baldwin
Erie	10	2-8-4	Freight	468,800	72,000	28½ x 32	March	August	Lima
	15	0-8-0	Sw.	236,280	57,210	25 x 28	March	August	Baldwin
	10	2-8-4	Freight	468,800	72,000	28½ x 32	March	September	Lima
Ferguson & Edmonson Co	1	2-8-0	.....	120,000	.....	18 x 24	.....	.....	American
Fisher Lumber Co	1	Geared	Logging	92,000	25,000	14 x 12	June	September	Heisler
General Logging Co	1	Geared	.....	180,000	35,460	14 x 16¾	1929	1929	Heisler
Georgia Northern	1	2-8-2	Freight	189,470	33,400	20 x 28	January	.....	Baldwin
Grand Trunk Western	12	0-8-0	Sw.	215,150	49,690	22 x 28	April	.....	Baldwin
	3	4-6-2	Pass.	299,330	40,700	25 x 28	May	.....	Baldwin
Great Northern	25	2-8-2	Freight	348,000	72,000	31 x 32	May	July '30	Company Shops
	6	2-8-8-2	Freight	630,750	146,000	28x32-4cyl.	July	July '30	Company Shops
	14	4-8-4	Pass.	413,000	58,300	29 x 29	August	May '30	Baldwin
	*1	Tenders	.....	314,900	.....	.....	May	November	Company Shops
	*24	Tenders	.....	317,100	.....	.....	May	July '30	Company Shops
	*10	Tenders	.....	363,000	.....	.....	January	Apr. '30	Company Shops
	*3	Tenders	.....	363,000	.....	.....	March	Apr. '30	Company Shops
	*3	Tenders		363,000	.....	.....	November	Apr. '30	Company Shops
Green Bay & Western	1	2-8-0	Freight	174,200	38,200	21 x 28	Dec. '28	April	American
Hamilton Coke & Iron Co	1	2-8-0	Sw.	184,000	42,000	22 x 28	March	June	Baldwin
Hammond Lumber Co	2	2-6-6-2	Freight	220,000	37,600	17&26x24	March	.....	Baldwin
Edward Hines West. Pine Co	1	2-8-2	Freight	280,560	63,100	24 x 30	June	.....	Baldwin
Humble Oil & Ref. Co	1	0-6-0	Sw.	130,000	31,860	20 x 26	August	.....	Baldwin
Illinois Central	15	0-8-0	Sw.	221,700	51,041	25 x 28	February	June	Lima
Illinois Northern	1	0-6-0	Sw.	192,000	46,800	23 x 28	June	.....	Baldwin
Illinois Terminal	3	2-8-2	Freight	262,000	53,500	25 x 30	March	August	Baldwin
Island Creek Coal Co	1	2-8-0	.....	.....	.....	.....	January	.....	Lima
Jeddo Highland Coal Co	1	0-6-0	Sw.	111,000	24,100	17 x 24	March	.....	Baldwin
Kentucky & Indiana Terminal	4	0-6-0	Sw.	189,000	44,200	.....	November	Jan. '30	Lima
	4	0-8-0	Sw.	220,000	58,000	.....	November	.....	Lima



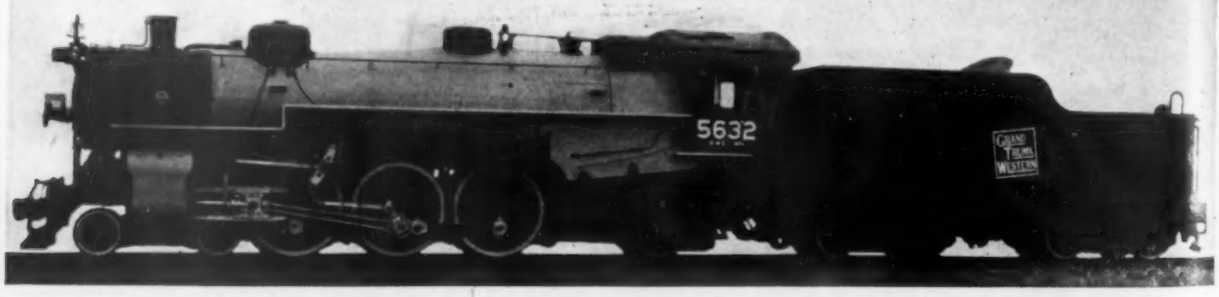
Six-Wheel Switch Engine Built by Baldwin Locomotive Works



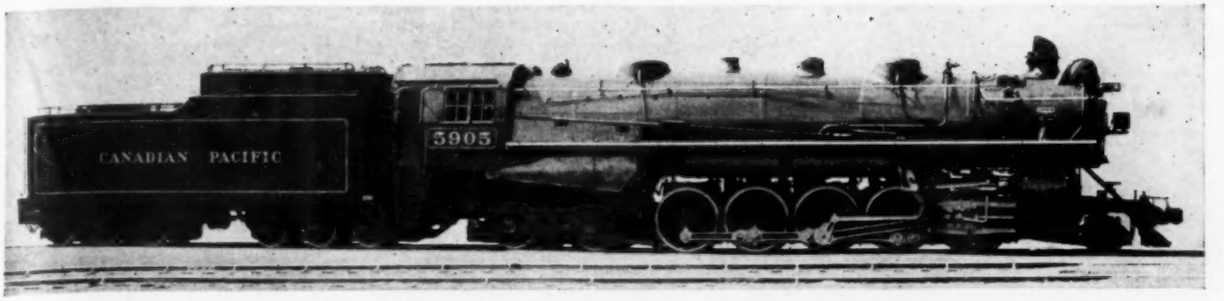
Louisville & Nashville 2-8-2 Type Locomotive Built by Baldwin Locomotive Works

Purchaser	No.	Type	Service	Weight	Tractive force	Cylinders	Date of order	Date of delivery	Builder
Kewaunee, G. B. & Westn	1	2-8-0	Freight	174,200	38,200	21 x 28	Dec. '28	April	American
Lehigh Coal & Nav. Co	4	Geared	.....	120,000	26,550	14 x 15½	1929	1929	Heisler
Lodwick Lumber Co	1	2-6-0	Freight	76,900	13,650	14 x 20	March	.....	Baldwin
Long Island	12	4-6-0	Pass.	237,000	41,328	24 x 28	March	November	Company Shops
McCormick Lumber Co., C. R.	1	2-8-2	Freight	169,000	29,100	18 x 24	September	.....	Baldwin
Manila Railroad	4	4-6-2	.....	.....	.....	.....	April	.....	Baldwin
	2	2-8-2	.....	.....	.....	.....	April	.....	Baldwin
Manufacturers Ry. of St. Louis	2	0-8-0	Sw.	233,210	72,000	25 x 28	January	.....	Baldwin
Michigan Alkali Co	1	0-4-0	Sw.	99,000	22,400	16 x 24	May	.....	Baldwin
Michigan Central	15	4-6-4	Pass.	348,000	42,300	25 x 28	June	Jan. '30	American
Michigan Northern Power Co	1	0-6-0	.....	130,000	.....	18 x 24	.....	.....	American
Minneapolis, St. P. & Sault Ste. Marie	3	4-8-2	Freight	342,000	53,900	27 x 30	June	Jan. '30	Company Shops
Mississippi Central	1	2-8-2	.....	251,000	.....	23 x 28	.....	.....	American
Missouri Pacific	5	4-8-2	.....	.....	.....	.....	December	.....	American
	25	2-8-4	Freight	.....	.....	.....	December	.....	Lima
Monessen Southwestern	1	0-6-0	.....	166,000	.....	22 x 26	April	.....	American
Nashville, Chattanooga & St. Louis	5	4-8-4	Pass.	389,000	70,000	25 x 30	October	Feb. '30	American
Nevada Cons. Copper Co	1	2-8-0	.....	224,000	.....	23 x 28	February	.....	American
Newburgh & South Shore	1	0-6-0	Sw.	182,000	43,000	22 x 28	November	Jan. '30	Baldwin
New Cornelia Copper Co	4	0-6-0	Freight	137,000	31,800	19 x 26	March	July	American
	3	0-6-0	Freight	137,000	31,800	19 x 26	April	July	American
New England F. & T. Co	1	0-8-0	.....	210,000	.....	25 x 28	.....	.....	American
New Orleans, Natalbany & Natchez	1	2-8-2	Freight	177,000	34,000	20 x 28	October	Jan. '30	American
New York Central	50	4-8-2	Freight	368,500	73,000	27 x 30	June	Mar. '30	American
	40	4-6-4	Pass.	355,200	53,260	25 x 28	June	Feb. '30	American
	1	4-8-4	.....	405,000	.....	15¼ &22½x28	May	.....	American
New York, Chicago & St. Louis	4	4-6-4	Pass.	316,500	40,600	25 x 26	May	November	Lima
New York, Ontario & Western	10	4-8-2	.....	363,000	.....	27 x 30	March	.....	American
Norfolk & Western	10	2-8-8-2	Freight	580,000	120,795	25&39x32	December	Mar.-Dec.	Company Shops
Northern Pacific	11	2-8-8-4	Freight	717,000	140,000	26x32-4cyl.	August	.....	Baldwin
Patapsco & Back Rivers	2	0-6-0	Sw.	175,000	44,000	23 x 28	May	.....	Baldwin
	2	0-6-0	Sw.	175,000	44,000	23 x 28	August	.....	Baldwin
Peninsular Ry	1	2-8-2	Freight	186,000	35,400	20½ x 28	February	.....	Baldwin
Pennsylvania	50	4-8-2	Freight	388,000	64,550	27 x 30	October	June '30	Baldwin
	25	4-8-2	Freight	388,000	64,550	27 x 30	October	Apr. '30	Lima
	25	4-8-2	Freight	388,000	64,550	27 x 30	October	June '30	Company Shops
Pere Marquette	10	0-8-0	Sw.	220,600	45,200	22 x 28	March	August	Baldwin
Pickands, Mather & Co	2	0-8-0	Sw.	258,400	60,100	25 x 28	January	.....	Baldwin
Pittsburgh & Lake Erie	25	0-8-0	Sw.	230,400	55,417	25 x 28	June	November	Lima
Rutland	3	4-6-2	Pass.	292,500	43,800	25 x 28	May	October	American
St. Louis-San Francisco	20	2-8-2	Freight	.....	.....	27 x 32	November	.....	Baldwin
Sherwood Templeton Coal Co	2	Geared	.....	90,000	22,000	12 x 14	1929	1929	Heisler
Sierra Railway of Cal	1	2-8-2	Freight	210,000	41,000	21 x 28	October	Feb. '30	American
Southern Pacific	10	4-8-2	Pass.	368,000	57,510	28 x 30	April	March	Company Shops
	16	4-8-8-2	Pass.&Frt.	622,600	112,760	24x32-4cyl.	March	September	Baldwin
	*20	Tenders	.....	291,100	.....	.....	April	April '30	Company Shops
	25	4-8-8-2	.....	.....	.....	.....	December	.....	Baldwin
	14	4-8-4	.....	.....	.....	.....	December	.....	Baldwin
Standard Fruit & S. S. Co	1	Geared	.....	140,000	32,120	14 x 16¾	1929	1929	Heisler
Standard Oil of Indiana	1	0-6-0	Sw.	180,000	.....	22 x 28	July	.....	American
Stone & Webster Eng. Corp	1	0-4-0	Sw.	99,000	22,400	16 x 24	October	.....	Baldwin
Stone Co., James	1	0-4-0	Sw.	65,000	.....	13 x 20	April	.....	American
Temple Lumber Co	1	2-8-2	Freight	185,000	34,000	20 x 28	October	.....	Baldwin
Terminal R. R. Assoc. of St. Louis	5	0-8-0	Sw.	262,360	68,068	26 x 28	January	September	Company Shops
Texas & Pacific	15	2-10-4	.....	.....	.....	.....	August	.....	Lima
Texas South-Eastern	1	2-8-2	.....	.....	.....	.....	November	.....	Baldwin
Timken Roller Bearing Co	1	4-8-4	.....	410,000	.....	27 x 30	July	.....	American
Union Pacific	25	4-12-2	Freight	497,000	96,650	27x31&32-3cyl.	February	June-Oct.	American
Union Railroad	12	0-6-0	Sw.	187,730	58,500	22 x 28	March	.....	Baldwin
United Elect. Coal Cos	5	Geared	.....	90,000	22,000	12 x 14	1929	1929	Heisler
Wabash	25	4-8-2	Freight	392,000	66,568	27 x 32	July	Jan. '30	Baldwin
	25	4-8-4	Freight	457,000	70,750	27 x 32	December	1930	Baldwin

* Not included in totals.



Grand Trunk Western 4-6-2 Type Built by Baldwin Locomotive Works



Canadian Pacific 2-10-4 Type Built by Montreal Locomotive Works, Ltd.

Purchaser	No.	Type	Service	Weight	Tractive force	Cylinders	Date of order	Date of delivery	Builder
Weirton Steel Company	1	0-4-0	Sw.	76,000	12,110	22 x 18	February	April	Porter
Western Pacific	5	2-8-2	.....	335,000	.....	28 x 30	March	.....	American
Wetmore & Morse Granite Co	1	0-6-0	Sw.	114,200	24,100	17 x 24	April	.....	Baldwin
Weyerhaeuser Timber Co	2	2-6-6-2	Freight	245,700	44,800	16x24-4cyl.	January	.....	Baldwin
	1	2-6-6-2	Freight	263,250	46,900	16x24-4cyl.	January	.....	Baldwin
	1	2-8-8-2	Freight	355,300	75,000	23&35x28	January	.....	Baldwin
Wheeling & Lake Erie	3	0-6-0	Sw.	164,900	39,102	21 x 28	September	.....	Company Shops
	10	0-8-0	Sw.	219,130	52,500	25 x 28	September	.....	Company Shops

Canada

Purchaser	No.	Type	Service	Weight	Tractive force	Cylinders	Date of order	Date of delivery	Builder
Algoma Central & Hudson Bay	2	2-10-2	Freight	338,800	60,250	24 x 28	Dec. '28	July	Canadian
Canadian Car & Foundry Co	1	0-6-0	Sw.	124,700	28,720	19 x 26	January	May	Canadian
Canadian National	10	0-8-0	Sw.	.....	.....	.....	December	.....	Company Shops
	12	4-8-2	.....	.....	.....	.....	December	.....	Montreal
	18	2-10-2	.....	.....	.....	.....	December	.....	Canadian
Canadian Pacific	20	2-10-4	Freight	452,500	77,200	25½ x 32	January	September	Montreal
	10	4-6-4	Pass.	351,000	45,300	22 x 30	May	December	Montreal
	1	.....	.....	.....	.....	.....	May	.....	Company Shops
Essex Terminal Ry	1	0-6-0	.....	146,000	.....	20 x 26	.....	.....	Montreal
Jamaica Government Ry	*2	4-8-0	Freight	151,000	32,870	19 x 26	May	August	Canadian
Quebec Central	1	4-6-2	Pass.	219,000	31,000	22½ x 28	February	May	Company Shops

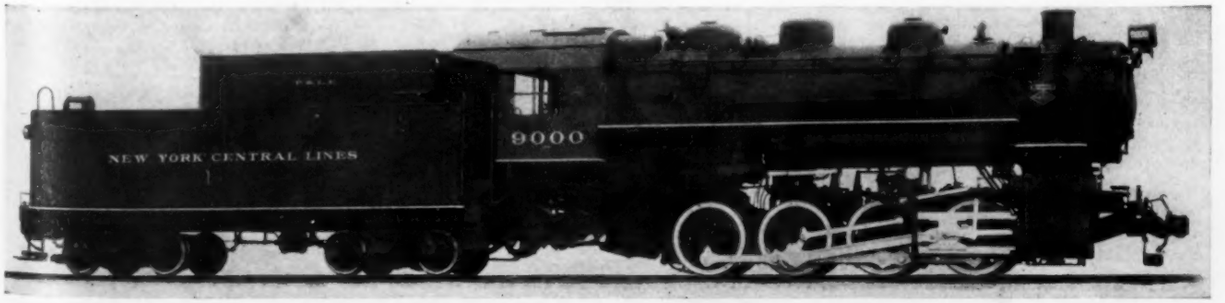
* Not included in totals.

Export

Purchaser	No.	Type	Service	Weight	Tractive force	Cylinders	Date of order	Date of delivery	Builder
Braden Copper Co	1	Shay	Freight	119,200	25,830	11 x 12	July	September	Lima
Bwana M'Kubwa Copper M. Co., Ltd.	1	2-6-2	.....	105,000	.....	15 x 20	.....	.....	American
Campbell River Timber Co., Ltd	1	2-8-2	Freight	167,900	29,100	18 x 24	May	.....	Baldwin
	1	2-8-2	Freight	167,900	29,100	18 x 24	July	.....	Baldwin
Cerro de Pasco (Peru)	2	2-8-0	.....	176,000	.....	21 x 28	December	.....	American
Chilean State Rys	12	4-8-2	.....	.....	.....	.....	August	.....	Baldwin
	5	4-8-2	.....	.....	.....	.....	October	.....	Baldwin
Hudson Bay Mining & Smelt. Co., Ltd.	1	0-4-0	Sw.	99,000	22,400	16 x 24	May	.....	Baldwin
International Rys. of Cent. Am	2	2-8-2	Pass.	.....	.....	18 x 22	January	April	Baldwin
Kirin Hilung	3	4-6-2	.....	185,000	.....	20 x 26	.....	.....	American
	3	2-8-2	.....	191,000	.....	20 x 28	.....	.....	American
Kwang Tung Wueh Han (China)	2	4-8-2	.....	.....	.....	.....	January	.....	Baldwin
Newfoundland Railway	2	4-6-2	.....	128,000	.....	18 x 24	.....	.....	American
Paracatu Ry. (Brazil)	1	2-6-2	.....	.....	.....	.....	November	.....	Baldwin
Rede de V. Cearense (Brazil)	3	2-8-2	.....	.....	.....	.....	August	.....	Baldwin
Royal State Rys. (Siam)	6	4-6-2	.....	.....	.....	.....	May	.....	Baldwin
Sorocabana Ry	5	4-10-2	.....	235,000	.....	18½x24&22-3cyl.	April	.....	American
South African Rys	8	4-6-2	.....	.....	.....	.....	March	.....	Baldwin
	4	4-8-2	.....	.....	.....	.....	March	.....	Baldwin
Tientsin-Pukow (China)	10	2-8-2	.....	.....	.....	.....	March	.....	Baldwin
United Fruit Company	1	2-8-0	Freight	89,000	.....	15 x 20	April	July	Baldwin

Oil-Electric, Gas-Electric or Gasoline Locomotives[1]

Purchaser	No.	Wheel arrangement	Type	Weight	Tractive force	Horse-power	Date of order	Date of delivery	Builders
American Roll. M. Co	2	0-4-4-0	Oil-Elect.	148,400	40,000	300	August	Feb. '30	Amer.-Ingersoll R.-G.E.
American Steel & W. Co	1	0-4-4-0	Oil-Elect.	140,000	42,000	400	November	.....	Westinghouse
Buffalo G. E. Co	1	0-4-4-0	Oil-Elect.	133,700	36,000	300	October	December	Amer.-Ingersoll R.-G.E.
Chicago, Bur. & Q	1	0-2-2-0	Gas-Elect.	60,000	20,000	170	June	June	Mack-International
Chicago, M., St. P. & P	2	0-8-0	Oil-Elect.	160,000	48,000	600	April	December	Whitcomb-West.
Com. Edison Co	1	0-4-4-0	Gas-Elect.	180,000	43,200	.....	.....	.....	St. Louis Car-G.E.
Delaware, L. & W	2	0-4-4-0	†Oil-Elect.	280,000	60,000	300	October	June '30	Ingersoll R.-G.E.



Eight-Wheel Switcher Built by Lima Locomotive Works, Inc.

Purchaser	No.	Wheel arrangement	Type	Weight	Tractive force	Horse-power	Date of order	Date of delivery	Builders
Erie	1	.....	[2]Oil-Elect.	190,000	23,600	600	September	Mar. '30	Westinghouse
	1	0-4-4-0	Oil-Elect.	228,000	64,000	800	June	Jan. '30	Ingersoll R-G.E.
Fate-Root-Heath Co	1	0-4-4-0	Gas-Elect.	100,000	30,000	370	July	.....	Westinghouse
Foley Brothers	1	0-4-4-0	Oil-Elect.	220,000	66,000	600	May	December	Ingersoll R.-G.E.
Ford Motor Co	1	0-4-4-0	Oil-Elect.	216,000	66,000	600	[4]October	Feb. '30	Ingersoll R.-G.E.
	1	0-4-4-0	Oil-Elect.	144,000	41,000	300	October	Mar. '30	Ingersoll R.-G.E.
Great Lakes Steel	2	0-4-4-0	Oil-Elect.	140,000	42,000	300	November	.....	Westinghouse
Heisler Loco. Wks	1	0-4-4-0	Gas-Elect.	100,000	30,000	440	October	.....	Westinghouse
Illinois Central	5	0-4-4-0	Oil-Elect.	220,000	66,000	600	July	Jan. '30	Ingersoll R.-G.E.
	1	0-4-4-0	Oil-Elect.	180,000	54,000	1,000	1928	September	St. Louis Car-G.E.
Illinois Terminal	2	0-4-4-0	§Gas-Elect.	180,000	50,000	1,180	November	April '30	St. Louis-Buda-G.E.
Illinois Traction	1	0-4-4-0	Oil-Elect.	180,000	54,000	1,000	.....	.....	St. Louis Car-G.E.
Lehigh Valley	2	0-6-0	Gas-Elect.	84,000	25,200	225	June	November	Mack-International
Massena Terminal	1	0-4-4-0	Gas-Elect.	62,000	17,360	226	June	July	Porter
Michigan Central	4	0-4-4-0	‡Oil-Elect.	257,000	77,100	1,665	November	Aug. '30	Amer.-Ingersoll R.-G.E.
New York Central	35	0-4-4-0	‡Oil-Elect.	257,000	77,100	1,665	August	1930-1931	Amer.-Ingersoll R.-G.E.
Northern Ill. Coal Corp	1	0-4-4-0	Gas-Elect.	88,000	22,000	300	January	February	Porter
Pennsylvania	1	0-4-0	Oil-Elect.	130,000	40,000	450	October	.....	Company Shops
Porter Co., H. K	1	0-4-4-0	Oil-Elect.	120,000	36,000	360	October	.....	Westinghouse
Timken Roller B. Co	1	0-4-0	Gas-Elect.	70,000	17,500	180	August	September	Porter
Union Pacific	1	2-2	Gasoline	124,000	6,000	...	April	May	Whitcomb
Western Elec. Co	1	0-4-4-0	Oil-Elect.	110,000	33,000	300	August	December	Westinghouse
Westinghouse E. & M. Co	1	0-4-4-0	Oil-Elect.	220,000	66,000	800	October	.....	Company Shops
	2	0-4-4-0	Oil-Elect.	140,000	42,000	400	October	.....	Company Shops

Canada

Purchaser	No.	Wheel arrangement	Type	Weight	Tractive force	Horse-power	Date of order	Date of delivery	Builders
Canadian National	1	0-4-4-0	Oil-Elect.	130,000	45,000	400	March	Mar. '30	Canadian-C.West.

Export

Purchaser	No.	Wheel arrangement	Type	Weight	Tractive force	Horse-power	Date of order	Date of delivery	Builders
Anglo-Chilean Con. N	3	0-4-4-0	[3]Oil-Elect.	60,000	18,000	240	April	December	General Electric
	3	0-4-4-0	[3]Oil-Elect.	60,000	18,000	240	December	Mar. '30	General Electric
Chiriqui Land Co	3	0-4-4-0	[3]Oil-Elect.	80,000	24,000	250	July	Jan. '30	General Electric
Cia. F. C. Transc	2	0-4-0	[3]Gas-Elect.	46,500	13,000	140	May	June	Porter
International Rys. of C. Am	1	.....	.....	32,000	.....	...	....	January	Baldwin
United Fruit Co	3	.....	Oil-Elect.	60,000	.....	250	1929	.....	Elect. Mot.-G.E.
	2	0-4-0	Gas-Elect.	45,000	13,500	165	April	July	Westinghouse

[1] For switching service unless otherwise noted.
[2] Passenger service.
[3] Freight service.

† Trolley; Oil-Electric; Battery.
§ Trolley; Distillate; Battery.
‡ Oil-Electric; Battery.

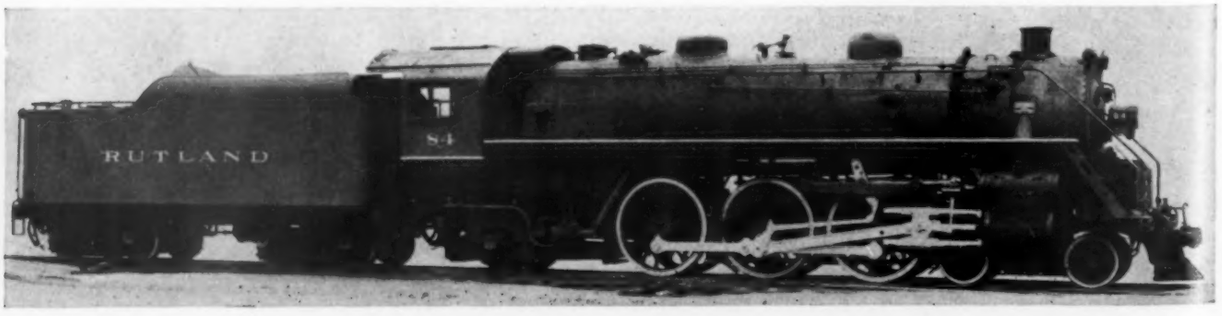
Electric Locomotives

Purchaser	No.	Wheel arrangement	Service	Weight	Tractive force, max.	Horse-power one hr.	Date of order	Date of delivery	Builder
Arkansas Valley	1	0-4-4-0	Sw.	100,000	30,000	308	February	April	General Electric
Byers Co., A. M	1	0-4-0	Sw.	140,000	35,000	185	September	December	Porter
Chicago, South Shore & South Bend	2	0-4-4-0	Freight	170,000	42,500	1,448	July	Jan. '30	General Electric
Davison C. & I. Co	1	0-4-0	Sw.	43,000	12,000	150	March	August	Porter
Ft. Dodge, D. M. & So	1	0-4+4-0	Freight	150,000	45,000	900	May	December	General Electric
Great Northern	4	2-6+6-2	Frt.&Pass.	527,000	126,300	3,600	September	June '30	General Electric
Illinois Central	4	0-4-4-0	Sw.	200,000	60,000	1,550	March	Feb. '30	Westinghouse
Illinois Terminal	4	4-4-4-4	Freight	160,000	40,000	900	January	December	Company Shops
Midland Utilities Co	2	0-4-4-0	Freight	170,000	51,000	1,445	July	December	General Electric
New York Central	42	0-6+6-0	Freight	270,000	81,000	2,500	October	1930-1931	American-G.E.
Northern Ind. P. S	1	0-4-4-0	Freight	150,000	45,000	400	September	Jan. '30	Westinghouse
Pennsylvania	4	4-4-4	Pass.	266,000	33,500	3,000	May	May '30	Company Shops
Philadelphia & Reading C. & I. Co	3	0-6-0	Sw.	70,000	21,000	280	September	December	Westinghouse
Sacramento Northern	1	0-4-4-0	Freight	120,000	36,000	1,200	June	Mar. '30	General Electric
Utah Copper Co	16	0-4+4-0	Freight	170,000	51,000	900	January	October	General Electric
	§§4	0-4+4-0	Freight	170,000	51,000	900	January	June	General Electric
Waterloo, C. F. & N	1	0-4-4-0	Sw.	106,000	31,800	360	November	Mar. '30	Westinghouse
Western Electric Co	1	0-4-4-0	Sw.	120,000	36,000	380	February	August	General Electric
	§§1	0-4-4-0	Freight	120,000	36,000	660	July	December	General Electric
Wisconsin Pub. Ser	1	0-4-4-0	Sw.	100,000	30,000	400	November	November	Westinghouse

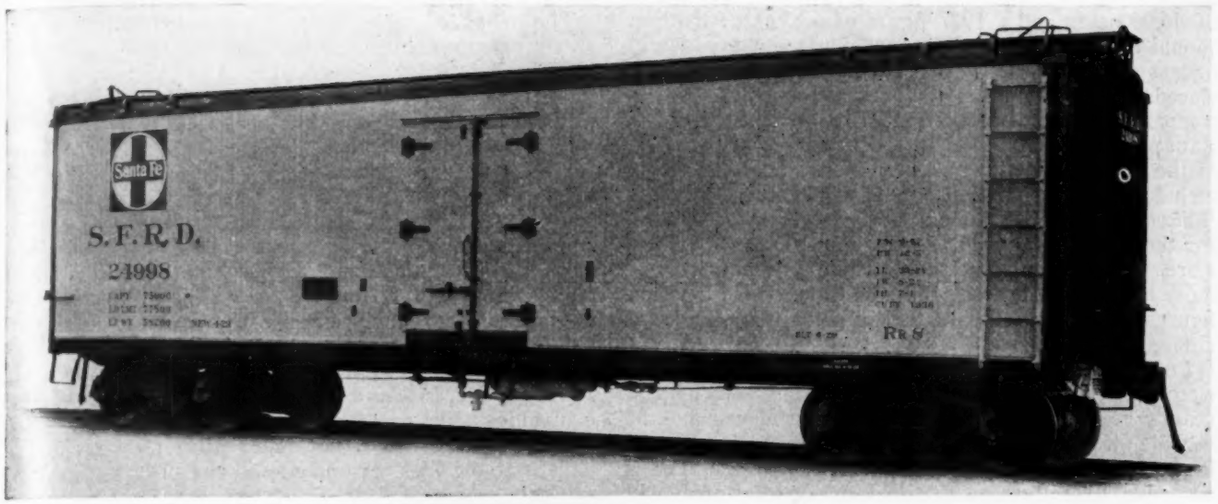
Export

Purchaser	No.	Wheel arrangement	Service	Weight	Tractive force, max.	Horse-power one hr.	Date of order	Date of delivery	Builder
Aichi Denki Tetsudo	1	0-4-4-0	Freight	88,000	26,400	500	May	August	Westinghouse
Chile Exp. Co	§§3	0-4+4-0	Freight	152,000	45,600	660	August	Feb. '30	General Electric
	3	0-4+4-0	Freight	160,000	48,000	600	August	Apr. '30	Westinghouse
Hudson Bay Mining & Smelt. Co	2	0-4+4-0	Freight	170,000	51,000	900	October	Mar. '30	General Electric
Paulista (Brazil)	4	2-6+6-2	Freight	294,000	71,100	2,700	March	November	General Electric

§§ Trolley; third rail, storage battery.



Rutland 4-6-2 Type Built by American Locomotive Company



Refrigerator Car Built for the Santa Fe by the Pullman Car & Manufacturing Corporation

Freight Car Orders in 1929

Purchases cross 100,000 mark for the first time since 1924— Total of 111,218 exceeded in only four years since 1913

By F. W. Kraeger
Associate Editor, *Railway Age*

FREIGHT cars ordered during 1929 for service in the United States totaled 111,218 and thus crossed the 100,000 mark for the first time since 1924 when 143,728 were ordered. This 1929 total exceeds that of all years since 1913 except four; it is more than double the 51,200 freight cars ordered during 1928 and is respectively 66 per cent and 54 per cent greater than the 1926 and 1927 orders. The four years since 1913 in which orders exceeded those of 1929 are 1916, 1918, 1922 and 1924. The 1922 total of 180,154 was the largest of these.

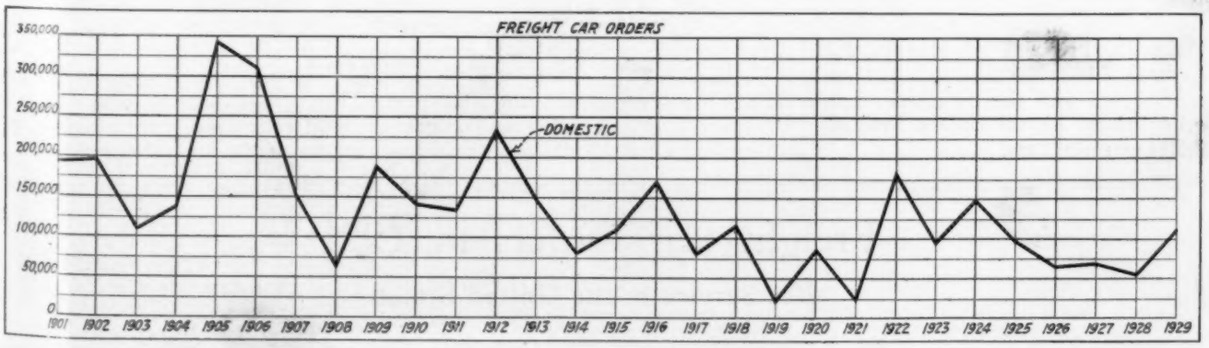
Canadian freight car orders, placed in that country by Canadian roads, manifested the same upward trend during 1929 as did the foregoing domestic orders and totaled 9,899, the high point of the past nine years. This Canadian total is exceeded by the comparable figure of only one year since 1918, namely 1920, when these roads placed orders for 12,406 freight cars. It compares respectively with 1928 and 1927 totals of 8,901 and 2,133.

Furthermore, continuing the same general trend, export orders for freight cars in 1929 reached their highest point in five years. The figure, 3,023, compares respectively with 1928 and 1927 figures of 2,530 and 646.

Table I—Freight Car Orders in 1929

For service in the United States	111,218
For service in Canada	9,899
For export to other countries	3,023
Grand total	124,140

Production records reveal that a total of 82,240 freight cars were built for service in the United States during 1929. This compares with a 1928 production



Freight Car Orders, 1901 to 1929

of 46,060 cars and a 1927 figure of 63,390. Attention should here be called to the fact that these production figures should not be confused with the totals of orders placed. Nor should this total number of cars built be compared with the installation of cars, reported in the statistics issued monthly by the Car Service Division of the American Railway Association, since that report includes only installations on Class I roads, whereas *Railway Age* figures include the production of all cars for the railroads as well as private car lines. Furthermore, the *Railway Age* totals include only new cars or those having new bodies, while the Car Service Division figures include leased cars, and in prior years, have included rebuilt cars.

Purchases, as reported weekly in the *Railway Age*, were, on the whole, well distributed throughout the past year, there being only three of the first eleven months in which less than 5,000 cars were ordered. During the first quarter of 1929 orders for each of its three months exceeded 10,000 cars with the January total of 12,452 exceeding the combined orders of the first three months of 1928. After this first quarter, however, the 10,000 figure was not again reached until October, the peak month of the year, when orders were placed for 17,207 freight cars. The low point of the year was July with its orders for 242. This latter was one of the two 1929 monthly figures which fell below the comparable 1928 total; the other was the November, 1929, figure of 5,126 which was about 1,000 cars under November, 1928.

Table II—Orders for Freight Cars Since 1901

Domestic Orders

Year	Freight cars	Year	Freight cars
1901	193,439	1908	62,669
1902	195,248	1909	189,360
1903	108,936	1910	141,024
1904	136,561	1911	133,117
1905	341,315	1912	234,758
1906	310,315	1913	146,732
1907	151,711	1914	80,264

Domestic and Foreign

Year	Domestic	Canadian	Export	Total
1915	109,792	.....	18,222	128,014
1916	170,054	.....	35,314	205,368
1917	79,367	.....	53,191	132,558
1918	114,113	9,657	53,547	177,317
1919	22,062	3,837	3,994	29,893
1920	84,207	12,406	9,056	105,669
1921	23,346	30	4,982	28,358
1922	180,154	746	1,072	181,972
1923	94,471	8,685	396	103,552
1924	143,728	1,867	4,017	149,612
1925	92,816	642	2,138	95,596
1926	67,029	1,495	1,971	70,495
1927	72,006	2,133	646	74,785
1928	51,200	8,901	2,530	62,631
1929	111,218	9,899	3,023	124,140

Prior to 1918, Canadian orders included in domestic.

The Atchison, Topeka, & Santa Fe ordered more freight cars during 1929 than any other road. Its purchases totaled 10,429. Next came the Chicago, Rock Island & Pacific with orders totaling 8,500 cars. Other roads purchasing 5,000 or more cars during the year were: The Missouri Pacific, 7,835; the Baltimore & Ohio, 7,601; the Pennsylvania, 7,215; the New York Central, 7,108; the Chicago, Milwaukee, St. Paul & Pacific, 5,465 and the Southern, 5,000. Each of seven other roads placed orders involving the purchase of 2,500 or more cars.

The appended tables contain a detailed statement of orders placed for new freight cars with builders during 1929 by railroads and industrial concerns; also those placed in Canada and for export. The list of orders was compiled from information furnished to the *Railway Age* by the railroads, private car lines, and other purchasers of cars, in response to requests for this information. The data thus furnished were then checked against lists of orders supplied by the car builders, and amplified accordingly, and also against the weekly reports of orders appearing in the Equipment and Supplies column of the *Railway Age*. The production figures were secured in response to requests to the car builders for this information. As in former years the *Railway Age* is especially indebted to the American Railway Car Institute in securing the reports of the companies affiliated with that organization.

The *Railway Age* is not sufficiently optimistic to believe that the lists can include all the orders placed or that the figures of production are of scientific accuracy. It feels that such accuracy would be next to impossible, in view of the short space of time permitted for the compilations due to the desirability of having the results available at the close of the year with which they deal. However, it is believed that such omissions as occur will be found to be small and unimportant, and will not vitiate the value of the figures, particularly as concerns comparison with preceding years which, after all, is the primary purpose of the compilations.

Table III—Freight Cars Built in 1929

	United States	Canada	Total
Domestic	82,240	8,557	90,797
Foreign	3,168	....	3,168
Total	85,408	8,557	93,965

Comparison with Previous Years

Year	Domestic	Foreign	Total
1899	117,982	1,904	119,886
1900	113,070	2,561	115,631
1901	132,591	4,359	136,950
1902	161,747	2,800	162,599
1903	153,195	1,613	152,801
1904	60,955	1,995	60,806
1905*	162,701	5,305	165,155
1906*	236,451	7,219	240,503
1907*	280,216	9,429	284,188
1908*	75,344	1,211	76,555
1909*	91,077	2,493	93,570
1910*	176,374	4,571	180,945
1911*	68,961	3,200	72,161
1912†	148,357	4,072	152,429

* Includes Canadian output.
† Includes Canadian output and equipment built in company shops.

	United States			Canadian			Grand
	Domestic	Foreign	Total	Domestic	Foreign	Total	total
1913	176,049	9,618	185,667	22,017	....	22,017	207,684
1914	97,626	462	98,088	6,453	....	6,453	104,451
1915	58,226	11,916	70,142	1,758	2,212	3,970	74,112
1916	111,516	17,905	129,421	....	....	5,580	135,001
1917	115,705	23,938	139,643	3,658	8,100	11,758	151,401
1918	67,063	40,981	108,044	14,704	1,960	16,664	124,708
1919	94,981	61,783	156,764	6,391	30	6,421	163,185
1920	60,955	14,480	75,435	....	....	....	....
1921	40,292	6,412	46,704	8,404	745	9,149	55,853
1922	66,289	1,126	67,415	458	100	558	67,973
1923	175,748	2,418	178,166	....	....	....	....
1924	113,761	1,141	114,902	1,721	....	1,721	116,623
1925	105,935	3,010	108,945	....	....	....	....
1926	88,862	2,771	91,633	1,645	....	1,645	93,278
1927	63,390	1,087	64,477	2,851	....	2,851	67,328
1928	46,060	938	46,998	5,158	.....	5,158	52,156
1929	82,240	3,168	85,408	8,557	....	8,557	93,965

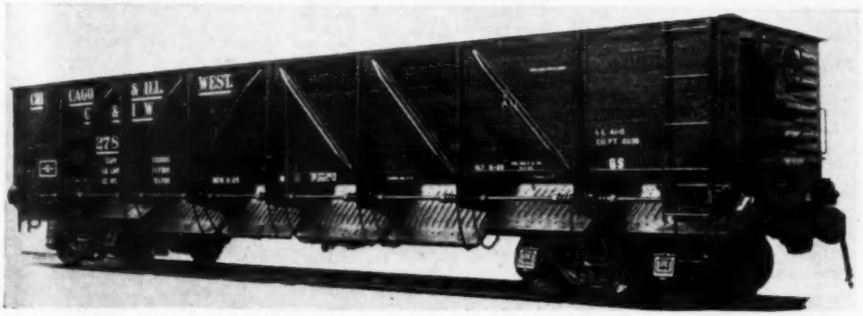
Freight Car Orders in 1929

For Service in the United States

Purchaser	No.	Class	Capacity	Length Ft.	Length In.	Construction	Weight	Date of Order	Date of Delivery	Builder
Alabama Great Southern	500	D. S. Auto-Box	80,000	40	6	Steel Frame	47,600	October	Feb. '30	Am. Car & Fdy.
Alaska	4	Ins. Box	80,000	38	0	Wood	32,000	September	Mar. '30	Company Shops
	2	Caboose	.....	30	0	St. Und'frame	40,000	September	December	Company Shops

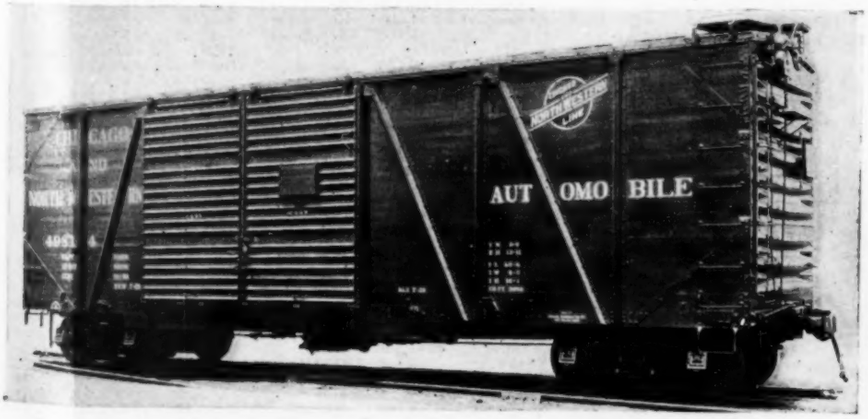
Automobile Car Built by the Ralston Steel Car Company

Composite Gondola Built by the Magor Car Corporation



Drop Bottom Gondola Built by the Ryan Car Company

Single-Sheath Box Car Built by the Bettendorf Company



Automobile Car Built by the General American Car Company

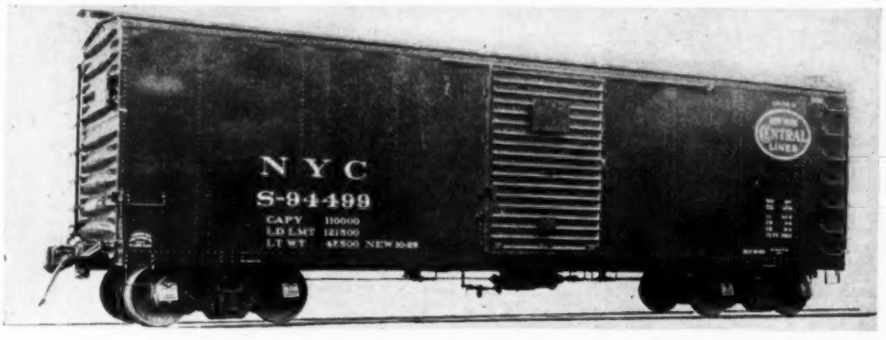
Purchaser	No.	Class	Capacity	Length Ft.	Length In.	Construction	Weight	Date of Order	Date of Delivery	Builder
Alexander & Baldwin	2	Tank	6,125g.	.....		Steel	37,200	May	June	Pet. Iron Works
American Black Granite	2	Flat	140,000	21	3	Steel Frame	34,200	February	May	Siems-Stembel
American Bridge Co	10	Flat	50-ton	40	0	Steel Frame	36,700	March	May	Koppel
American Chemical Paint Co	1	Tank	8,000g.	28	0	Steel	43,700	February	April	Am. Car & Fdy.
American Oil Co	2	Tank	.....	.....		.....	.....	March	.....	Gen. Amer. Tank
	1	Tank	.....	.....		.....	.....	March	.....	Gen. Amer. Tank
American Sheet & Tinplate Co	1	Air Dump	50-ton	32	4	Steel	78,100	March	April	Koppel
American Smelting & Ref. Co	25	Gondola	50,000	17	0	Steel	21,753	January	May	Magor
American Steel Foundries	3	Air-Dump	100,000	34	6	Steel	60,900	February	June	Magor
Ann Arbor	100	Hopper	10,000	30	6	Steel	39,600	July	Nov.-Dec.	Company Shops
Ansul Chemical Co	1	Tank	60,000	42	3	Steel	32,750	March	March	Am. Car & Fdy.
	1	Tank	40,000	28	0	Steel	47,600	November	Jan. '30	Am. Car & Fdy.
Atchison, Topeka & Santa Fe	500	S. D. Stock	80,000	40	0	Steel Frame	42,600	March	May	Penn. Car
	250	D. D. Stock	80,000	40	0	Steel Frame	48,000	March	June	Penn. Car
	300	S. S. Box	100,000	40	6	Steel Frame	48,200	March	April	Am. Car & Fdy.
	500	S. S. Box	100,000	40	6	Steel Frame	48,500	January	June	Pullman
	700	S. S. Box	100,000	40	6	Steel Frame	48,600	January	June	Gen. Amer. Car
	500	S. S. Box	100,000	40	6	Steel Frame	48,200	January	July	Pressed Steel
	425	Gondola	100,000	40	7	Steel Frame	52,500	March	May	Am. Car & Fdy.
	250	Gondola	140,000	50	6	Steel Frame	63,400	January	July	Standard Steel
	500	Refrigerator	80,000	40	0	Steel Frame	58,000	January	May	Pullman
	150	Sulphur	140,000	40	1	St. Und'frame	53,900	March	June	Am. Car & Fdy.
	125	Caboose	.....	28	4⅞	Steel	48,600	March	May	Am. Car & Fdy.
	75	Hopper	140,000	38	0	Steel	52,400	March	August	Am. Car & Fdy.
	75	Hopper	140,000	38	0	Steel	51,100	January	July	Ralston Steel
	25	Ore	100,000	22	9½	Steel	49,800	January	August	Pressed Steel
	200	Flat	100,000	50	0	Steel Frame	49,600	March	May	Am. Car & Fdy.
	500	S. S. Box	100,000	40	6	Steel Frame	.....	October	.....	Am. Car & Fdy.
	1,500	S. S. Box	100,000	40	6	Steel Frame	.....	October	.....	Pullman
	1,000	S. S. Box	100,000	40	6	Steel Frame	.....	October	.....	Gen. Amer. Car
	500	S. S. Box	100,000	40	6	Steel Frame	48,300	October	Jan.-Feb.	Pressed Steel
	500	Refrigerator	80,000	40	0	Steel Frame	.....	October	.....	Pullman
	300	S. D. Stock	80,000	40	0	Steel Frame	42,900	October	Dec.-Jan.	Penn. Car
	300	Gondola	100,000	40	7	Steel Frame	.....	October	.....	Am. Car & Fdy.
	200	Ballast	100,000	30	6	Steel	.....	October	.....	Rodger Ballast
	104	Caboose	60,000	28	4⅞	Steel	.....	October	.....	Am. Car & Fdy.
	200	Gondola	140,000	50	4⅝	Steel Frame	.....	October	.....	Standard Steel
	150	Flat	100,000	50	9	Steel Frame	.....	October	.....	Am. Car & Fdy.
	500	Automobile	100,000	50	6	Steel Frame	60,300	October	Jan.-Feb.	Pressed Steel
	100	Tank	.....	.....		Steel	.....	November	.....	Gen. Amer. Tank
Atlantic Refining Co	6	Tank	7,700g.	29	4¾	Steel	48,800	January	April	Standard Steel
	6	Tank	7,700g.	33	7¾	Steel	50,370	November	Mar. '30	Standard Steel
Baldwin Locomotive Works	4	Gondola	140,000	46	2½	Steel	52,700	March	July	Am. Car & Fdy.
Baltimore & Ohio	100	D. S. Caboose	.....	24	0⅛	St. Und'frame	40,900	April	August	Company Shops
	2,000	D. S. Box	100,000	40	6	Steel	47,600	April	August	Standard Steel
	1,500	D. S. Box	100,000	40	6	Steel	47,600	August	Jan. '30	Standard Steel
	1,000	Gondola	140,000	50	0	Steel	54,700	May	October	Am. Car & Fdy.
	1,000	Gondola	140,000	50	0	Steel	54,700	May	Jan. '30	Bethlehem
	1,000	Hopper	140,000	41	3	Steel	55,500	May	October	Standard Steel
	1,000	Hopper	140,000	41	3	Steel	56,100	May	September	Bethlehem
	1	Hopper	190,000	41	3	Steel	57,800	July	November	Company Shops
Bangor & Aroostook	2	Caboose	.....	.....		.....	.....	.....	1929	Company Shops
Barnsdall Refineries, Inc	1	Tank	8,050g.	.....		Steel	40,000	June	August	Pet. Iron Works
Barrett Company	5	Tank	50,000	39	3⅛	Steel	81,400	November	Jan. '30	Am. Car & Fdy.
Bessemer & Lake Erie	25	Gondola	140,000	65	0	Steel	67,000	October	January '30	Greenville St.
Bingham & Garfield	1	.....	.....	.....		.....	.....	.....	1929	Company Shops
Borden Company	20	Tank	.....	.....		.....	.....	1929	.....	Gen. Amer. Tank
Boston & Albany	500	Hopper	140,000	39	0	Steel	50,300	March	September	Standard Steel
Boston & Maine	500	Hopper	140,000	40	5	Steel	54,000	October	Jan. '30	Standard Steel
	1,000	S. S. Box	80,000	40	6	Steel Frame	45,000	June	December	Standard Steel
	1,000	S. S. Box	80,000	40	6	Steel Frame	45,500	October	Feb. '30	Standard Steel
	18	Air Dump	30 cu. yd.	34	6	Steel	62,000	August	August	Magor
	30	Air Dump	30 cu. yd.	34	6	Steel	62,000	September	November	Magor
Brown Company	1	Tank	60,000	30	0	Steel	53,800	July	August	Am. Car & Fdy.
Buffalo & Susquehanna	200	Hopper	110,000	30	6	Steel	40,000	June	December	Pressed Steel
Burke, Inc., Timothy	6	Dump	11 cu. yd.	19	0	Steel	29,000	July	September	Am. Car & Fdy.
	4	Dump	10 cu. yd.	19	0	Steel	27,400	September	November	Am. Car & Fdy.
Butler Brothers	15	Air Dump	.....	.....		.....	.....	October	.....	Koppel
Byllesby Eg. & Mgmt. Corp	1	Gondola	140,000	41	3	Steel	46,300	1929	.....	Pullman
Calco Chemical Co	1	Tank	60,000	42	3	Steel	33,790	March	March	Am. Car & Fdy.
California Dispatch Line	10	Tank	100,000	.....		Steel	47,500	September	October	Gen. Amer. Tank
Canfield Tank Line	4	Tank	80,000	.....		Steel	44,000	February	May	Standard Tank
Carbide & Carbon Chemical Co	1	Tank	6,000g.	27	0	Steel	35,300	May	July	Am. Car & Fdy.
	5	Tank	8,000g.	28	0	Steel	40,100	May	July	Am. Car & Fdy.
	1	Tank	8,000g.	28	0	Steel	45,700	May	July	Am. Car & Fdy.
Carnegie Steel Co	22	Gondola	.....	.....		.....	.....	June	.....	Greenville St.
Central Alloy Steel Co	1	Air Dump	50-ton	32	4	Steel	69,900	January	April	Koppel
Central Maine Power Co	6	Air Dump	40-ton	25	8	Steel	52,300	June	June	Koppel
Central of Georgia	500	Gondola	100,000	42	0	Steel	44,000	September	Feb. '30	Pullman
	50	Flat	100,000	42	0	St. Und'frame	36,500	September	Feb. '30	Pullman
	2	.....	.....	.....		.....	.....	.....	1929	Company Shops
Central of New Jersey	200	Gondola	140,000	65	0	Steel	70,000	August	Dec.-Jan.	Bethlehem
Central Vermont	500	S. S. Auto	80,000	40	6	Steel Frame	49,100	April	.....	Pullman
Champlin Tank Car Co	8	Tank	80,000	.....		Steel	45,000	April	June	Standard Tank
Charleston & Western Carolina	31	.....	.....	.....		.....	.....	.....	1929	Company Shops
Chesapeake & Ohio	125	Caboose	.....	24	0½	Steel Frame	44,000	February	Aug.-Nov.	Company Shops
	500	D. S. Box	80,000	40	6	Steel Frame	47,000	February	Aug.-Sept.	Pressed Steel
	500	Gondola	100,000	31	8⅞	Steel	42,400	February	Aug.-Sept.	Richmond Car
	1,500	Gondola	100,000	31	8⅞	Steel	42,400	February	June-Sept.	Am. Car & Fdy.
	577	Gondola	140,000	41	2⅞	Steel	51,500	April	Oct.-Dec.	Richmond Car
Chevrolet Motor Company	20	Gondola	140,000	40	0	Steel Frame	.....	October	Feb. '30	Standard Steel
Chicago & Eastern Illinois	500	Coal	110,000	40	7½	Steel Frame	47,000	October	December	Mt. Vernon Car
Chicago & Illinois Western	100	Hopper	140,000	41	3	Steel	56,400	February	October	Gen. Amer. Car
	100	Gondola	100,000	41	0	Steel Frame	51,400	February	August	Ryan
Chicago & North Western	500	Gondola	140,000	41	3	Steel Frame	46,300	January	May	Pullman
	500	Gondola	140,000	41	3	Steel Frame	45,500	January	May	Standard Steel
	500	S. S. Auto	80,000	40	6	Steel Frame	52,200	January	July	Pullman
	500	S. S. Auto	80,000	40	6	Steel Frame	50,100	January	July	Gen. Amer. Car
	500	Flat	100,000	50	0	St. Und'frame	41,500	October	December	Am. Car & Fdy.
Chicago, Burlington & Quincy	250	Hopper	110,000	33	8	Steel	44,800	May	July	Company Shops
	500	Gondola	100,000	40	0	Steel	45,500	June	September	Company Shops
	750	Gondola	100,000	41	6	Steel Frame	42,400	October	1930	Company Shops
	25	Caboose	.....	.....		Steel	.....	November	1930	Company Shops
Chicago Great Western	2	Caboose	.....	.....		.....	.....	July	.....	Mt. Vernon Car
Chicago, Indianapolis & Louisville	100	S. S. Box	80,000	36	6	Steel Frame	39,000	November	Feb. '30	Company Shops

Purchaser	No.	Class	Capacity	Length Ft.	Length In.	Construction	Weight	Date of Order	Date of Delivery	Builder
Chic., Milwaukee, St. P. & Pac.	1,000	Automobile	100,000	40	6	St. Und'frame	52,000	March	Aug.-Nov.	Bettendorf
	200	Automobile	100,000	40	6	St. Und'frame	51,000	March	August	Pac. Car & Fdy.
	500	Automobile	100,000	50	6	St. Und'frame	57,000	March	Aug.-Sept.	Pullman
	1,000	Ballast	140,000	42	0	Steel	61,400	March	Oct.-Dec.	Gen. Amer. Car
	500	S. D. Stock	80,000	40	6	Steel	43,000	March	Aug.-Sept.	Standard Steel
	150	D. D. Stock	80,000	40	6	Steel	46,500	March	October	Standard Steel
	350	Flat	100,000	45	0	St. Und'frame	39,000	March	July-Aug.	Ryan
	150	Flat	100,000	50	0	St. Und'frame	43,500	March	November	Pressed Steel
	300	Ore	140,000	21	0	Steel	43,800	March	July-Aug.	Pressed Steel
	500	Gondola	140,000	48	6	Steel Frame	59,000	September	Dec.-Jan.	Bettendorf
	500	Gondola	140,000	48	6	Steel Frame	59,000	September	Dec.-Jan.	Pressed Steel
	15	Caboose	.....	30	0	St. Und'frame	44,600	July	December	Company Shops
	300	Ore	140,000	20	10½	Steel	43,800	November	Feb.-Mar.	Pressed Steel
Chicago, North Shore & Milwaukee	1	Caboose	.....	29	4¾	St. Und'frame	38,200	May	September	Am. Car & Fdy.
Chicago, Rock Island & Pacific	1,000	S. S. Box	50-ton	40	6	Steel Frame	47,000	January	July-Aug.	Am. Car & Fdy.
	1,000	Coal	70-ton	48	6	Steel Frame	56,800	January	Aug.-Nov.	Pressed Steel
	250	Ballast	70-ton	40	5½	Steel	58,000	January	Oct.-Nov.	Standard Steel
	250	Flat	50-ton	46	0	St. Und'frame	40,300	January	May-June	Ryan
	1,000	Gondola	140,000	48	6	Steel Frame	56,600	November	Mar.-Apr.	Pressed Steel
	1,000	Gondola	140,000	.....		.....	...	December	.....	Pressed Steel
	1,000	Box	100,000	40	0	.....	.....	December	.....	Am. Car & Fdy.
	500	Box	100,000	40	0	.....	.....	December	.....	Gen. Amer. Car
	500	Box	100,000	40	0	.....	.....	December	.....	Pullman
	500	Automobile	80,000	50	6	.....	.....	December	.....	Standard Steel
	1,000	Automobile	80,000	40	0	.....	.....	December	.....	Bettendorf
	250	Flat	100,000	40	0	.....	.....	December	.....	Ryan
	250	Stock	80,000	40	0	.....	.....	December	.....	Ryan
Chicago Tank Car Co.	10	Tank	8,000g.	28	0	Steel	41,300	April	May	Am. Car & Fdy.
Cincinnati, Hamilton & Dayton	6	Ballast	80,000	34	11	St. Und'frame	40,400	April	June	Rodger Ballast
Cinn., New Orleans & Texas Pacific	1,000	D. S. Auto Box	80,000	40	6	Steel Frame	47,600	October	Jan. '30	Am. Car & Fdy.
Cities Service Tank Line	5	Tank	12,000g.	.....		Steel	.....	March	May	Gen. Amer. Tank
	4	Tank	4,000g.	.....		Steel	.....	July	September	Am. Car & Fdy.
Columbian Gasoline Corp.	25	Tank	8,000g.	.....		Steel	.....	October	.....	Gen. Amer. Tank
Columbus & Greenville	300	S. S. Box	80,000	40	6	St. Und'frame	42,600	June	October	Am. Car & Fdy.
Commercial Car Line	10	Tank	100,000	28	0	Steel	44,200	August	October	Am. Car & Fdy.
Conley Tank Car Co.	3	Tank	6,000g.	27	0	Steel	39,700	April	May	Am. Car & Fdy.
	15	Tank	8,000g.	28	0	Steel	41,900	May	May	Am. Car & Fdy.
Continental Tank Car Co.	57	Tank	8,000g.	28	0	Steel	41,500	February	March	Am. Car & Fdy.
Cook Paint & Varnish Co.	1	Tank	8,050g.	.....		Steel	40,000	May	July	Pet. Iron Wks.
	1	Tank	6,125g.	.....		Steel	37,000	May	July	Pet. Iron Wks.
Cornwall Railroad	20	Gondola	150,000	19	10	Steel	40,400	July	September	Bethlehem
Delaware & Hudson	150	Hopper	85,000	32	5	Steel Frame	38,600	June	December	Company Shops
Delaware, Lackawanna & Western	700	D. S. Box	110,000	40	6	Steel	52,000	August	December	Am. Car & Fdy.
	300	D. S. Box	110,000	40	6	Steel	52,000	August	Jan. '30	Magor
	250	S. S. Hopper	140,000	40	0	Steel	51,200	August	November	Am. Car & Fdy.
Derby Oil Company	20	Tank	80,000	36	8½	Steel	40,750	March	May	Gen. Amer. Tank
Detroit Chemical Works	2	Tank	10,000g.	32	9	Steel	49,800	February	April	Am. Car & Fdy.
Diamond Alkali Co.	1	Tank	30,000	28	6	Steel	45,000	November	November	Am. Car & Fdy.
Donner Steel Company	15	Gondola	100,000	36	0	Steel	44,000	June	October	Warren Tank Car
Dow Chemical Co.	2	Tank	10,000g.	28	0	Steel	47,600	January	March	Am. Car & Fdy.
	3	Tank	8,000g.	28	0	Steel	45,600	January	March	Am. Car & Fdy.
	3	Tank	8,000g.	28	0	Steel	43,400	January	March	Am. Car & Fdy.
	2	Tank	10,000g.	28	0	Steel	45,600	January	March	Am. Car & Fdy.
	2	Tank	8,000g.	28	0	Steel	48,800	August	November	Am. Car & Fdy.
Duluth, Missabe & Northern	1	Hopper	190,000	19	5	Steel	49,300	October	November	Am. Car & Fdy.
DuPont, E. I. de Nemours, Corp.	8	Tank	10,000g.	28	0	Steel	45,100	May	June	Am. Car & Fdy.
	32	Tank	10,000g.	28	0	Steel	45,100	June	Jan. '30	Am. Car & Fdy.
	5	Tank	10,000g.	31	6	Steel	44,200	October	December	Am. Car & Fdy.
	2	Tank	100,000	32	5⅝	Steel	26,000	October	December	Am. Car & Fdy.
	1	Tank	7,000g.	27	6	Steel	42,000	November	December	Am. Car & Fdy.
	2	Tank	8,000g.	31	6	Steel	41,000	November	December	Am. Car & Fdy.
	49	Tank	8,000g.	.....		Steel	.....	September	.....	Gen. Amer. Tank
Eason Oil Co.	50	Tank	8,050g.	.....		Steel	40,000	May	June-July	Pet. Iron Wks.
Eastern Michigan	8	Ballast	80,000	34	11	Steel Und'frame	39,800	March	June	Rodger Ballast
	1	Flat	80,000	50	6¼	Steel Und'frame	35,800	April	October	Am. Car & Fdy.
Electro Bleach. Gas Co.	2	Tank	60,000	30	0	Steel	60,700	April	June	Am. Car & Fdy.
Elgin, Joliet & Eastern	125	Gondola	140,000	48	6	Steel	55,500	February	June	Am. Car & Fdy.
	125	Gondola	140,000	48	6	Steel	55,800	February	July	Pressed Steel
	75	Flat	100,000	50	0	St. Und'frame	46,200	1929	August	Company Shops
	100	Gondola	100,000	40	0	Steel	43,200	1929	October	Company Shops
	25	Air Dump	35 cu. yd.	33	9	Steel	84,000	.....	November	Differential Steel
	25	Air Dump	35 cu. yd.	37	6	Steel	.....	.....	December	Magor
Erie	5	Flat	275,000	.....		Steel	105,200	1929	May	Standard Steel
	250	Gondola	70-ton	48	6	Steel	54,600	April	August	Bethlehem
	500	Auto-Box	40-ton	40	6	Steel	52,200	April	Aug.-Nov.	Am. Car & Fdy.
	250	Gondola	70-ton	48	6	Steel	54,600	April	Sept.-Nov.	Greenville St.
	1,000	Hopper	70-ton	40	5	Steel	55,000	April	Sept.-Nov.	Standard Steel
	25	Caboose	.....	25	6	Steel	44,200	1929	November	Magor
	500	Box	50-ton	40	6	Steel	46,400	April	1930	Gen. Amer. Car
Everist, L. G.	1	Air Dump	.....	.....		.....	.....	September	.....	Koppel
Federal Enameling & S. Co.	3	Air Dump	.....	.....		.....	.....	June	.....	Koppel
Fisher Lumber Corp.	20	Logging	60,000	20	0	.....	.....	January	.....	Am. Car & Fdy.
Fleischmann Transportation Co.	36	Tank	.....	.....		St. Und'frame	.....	1929	.....	Company Shops
Ft. Worth & Denver City	100	Gondola	100,000	41	6	St. Und'frame	40,600	January	March	Pressed Steel
Fruit Growers' Express	150	Refrigerator	75,000	33	2¾	St. Und'frame	56,500	1928	February	Company Shops
	150	Refrigerator	75,000	33	2¾	St. Und'frame	56,700	Nov. '28	May	Company Shops
	150	Refrigerator	75,000	33	2¾	St. Und'frame	56,200	Oct. '28	December	Company Shops
	15	Refrigerator	75,000	33	2¾	St. Und'frame	56,200	May	October	Company Shops
	15	Tank	9,800g.	31	9¾	Steel	55,300	July	November	Am. Car & Fdy.
General Chemical Co.	5	Flat	100,000	36	0	Steel Und'frame	16,840	April	June	Am. Car & Fdy.
General Electric Co.	6	Hopper	60,000	.....		.....	.....	January	.....	Magor
Goodwin-Gallagher Sand & G. Co.	2	Topper	140,000	41	3	Steel	55,700	July	October	Standard Steel
Gould Coupler Co.	2	S. S. Auto	80,000	40	6	Steel Frame	50,700	January	June	Pressed Steel
Grand Trunk Western	1,002	S. S. Auto	80,000	40	6	Steel Frame	50,700	April	July-Sept.	Pressed Steel
	500	S. S. Auto	80,000	40	6	Steel Frame	49,100	April	.....	Pullman
Grasselli Chemical Co.	7	Tank	6,200g.	25	0	Steel	41,800	July	September	Am. Car & Fdy.
Great Bear Spring Co.	2	Tank	8,000g.	28	0	Steel	50,200	April	June	Am. Car & Fdy.
Great Northern	301	Ore	150,000	19	11	Steel	44,100	September	June '30	Company Shops
	500	Flat	100,000	43	0	St. Und'frame	38,300	June	Mar. '30	Siems-Stembel
	25	Caboose	.....	24	5	St. Und'frame	35,900	September	December	Company Shops
	50	Hopper	100,000	29	9	Steel	36,700	April	August	Canton Car
	50	Hopper	100,000	29	9	Steel	36,700	October	December	Canton Car
Gulf Coast Lines	120	.....	.....	.....		.....	.....	.....	1929	Company Shops
Guthrie, A. & Co., Inc.	6	Air Dump	50-ton	32	4	Steel	78,600	March	September	Koppel
	10	Air Dump	20 cu. yd.	.....		.....	.....	September	.....	Koppel
Hercules Cement Co.	10	Cement	.....	.....		.....	.....	July	.....	Standard Steel
Hercules Powder Company, Inc.	2	Tank	80,000	32	0	Steel	42,000	April	June	Am. Car & Fdy.
Heyden Chemical Corp.	1	Tank	8,000g.	28	0	Steel	49,600	February	April	Am. Car & Fdy.
	1	Tank	8,000g.	28	0	Steel	50,600	July	October	Am. Car & Fdy.
	1	Tank	8,000g.	31	6	Steel	41,000	October	December	Am. Car & Fdy.
High Point, Thomasville, & D.	25	Fur.	.....	.....		.....	.....	June	.....	Standard Steel
Hill & Suender	2	Air Dump	25-ton	21	8	Steel	38,000	September	November	Koppel
Hocking Valley	100	Flat	100,000	.....		.....	.....	March	.....	Company Shops

Purchaser	No.	Class	Capacity	Length Ft.	Length In.	Construction	Weight	Date of Order	Date of Delivery	Builder
Illinois Central	700	S. S. Auto-Fur.	80,000	40	6	Steel Frame	49,900	February	October	Am. Car & Fdy.
	300	S. S. Auto-Fur.	80,000	50	0	Steel Frame	56,300	February	October	Mt. Vernon Car
	425	Hopper	140,000	41	3	Steel	56,400	February	November	Standard Steel
	325	Hopper	140,000	41	3	Steel	56,400	February	November	Gen. Amer. Car
	750	Hopper	100,000	34	9	Steel	47,800	February	October	Pullman
	200	Flat	100,000	45	0	Steel Frame	40,900	February	July	Bettendorf
	25	Caboose	.....	28	0	St. Und'frame	40,800	February	July	Am. Car & Fdy.
Illinois Elec. Limestone Co	12	Gondola	80,000	20	0	Steel	28,400	January	May	Am. Car & Fdy.
Independent Oil & Gas Co	5	Tank	80,000	.....		Steel	.....	September	October	Standard Tank
	100	Tank	80,000	.....		Steel	40,000	September	November	Pet. Iron Wks.
Inspiration Con. C. Co	4	Air Dump	.....	.....		.....	.....	July	.....	W. Wh. Scraper
International-Great Northern	100	.....	.....	.....		.....	.....	.....	1929	Company Shops
International Harvester	13	Hopper	140,000	40	0	Steel	56,600	July	December	Pressed Steel
Kanotex Refining Co	5	Tank	8,050g.	.....		Steel	40,000	May	July	Pet. Iron Wks.
Kaylor, H. W	4	Air Dump	50-ton	32	4	Steel	75,000	August	August	Koppel
Lehigh Coal & Navigation Co	3	Dump	100,000	34	0	Steel	82,000	1929	October	Differential Steel
	1	Air Dump	50-ton	32	4	Steel	78,700	May	September	Koppel
	7	Air Dump	.....	.....		.....	.....	June	.....	W. Wh. Scraper
Lehigh Valley	200	D. S. Auto-Box	100,000	40	6	Steel	54,890	January	May	Am. Car & Fdy.
	100	D. S. Auto-Box	100,000	40	6	Steel	54,890	January	May	Am. Car & Fdy.
	200	Gondola	140,000	50	0	Steel	57,650	February	May	Bethlehem
	700	Coal	140,000	40	0	Steel	51,880	February	December	Bethlehem
Live Poultry Transit Co	16	.....	.....	.....		.....	.....	.....	1929	Company Shops
Maine Central	1,004	D. S. Box	100,000	40	6	Steel	46,700	February	June-Aug.	Standard Steel
Manila Railroad	100	Flat	60,000	.....		.....	.....	July	.....	Gregg
	100	Box	60,000	.....		.....	.....	July	.....	Gregg
Mann Brothers Co	1	Tank	8,000g.	28	0	Steel	44,600	September	October	Am. Car & Fdy.
	1	Tank	10,000g.	28	0	Steel	45,200	September	October	Am. Car & Fdy.
Mathieson Alkali Works, Inc	20	Tank	80,000	.....		Steel	.....	.....	November	Standard Tank
Mesta Machine Co	1	Flat	200,000	35	0	Steel	41,800	July	October	Canton Car
Michigan Central	1,000	Box	110,000	40	6	Steel	53,300	March	October	Pullman
Michigan Limestone & Chemical Co	10	Air Dump	50-ton	28	10	Steel	78,700	Dec. '28	May	Koppel
Mid-Continent Petroleum Corp	1	Tank	6,000g.	.....		Steel	44,300	April	September	Gen. Amer. Tank
	1	Tank	6,000g.	.....		Steel	44,400	April	September	Gen. Amer. Tank
	1	Tank	6,000g.	.....		Steel	43,600	April	September	Gen. Amer. Tank
	2	Tank	6,000g.	.....		Steel	43,800	April	September	Gen. Amer. Tank
Minneapolis, St. P. & S. S. Marie	200	S. S. Box	80,000	40	0	Steel Frame	42,200	January	September	Pullman
	200	S. S. Box	80,000	40	0	Steel Frame	42,600	January	September	Siems-Stembel
Missouri-Kansas-Texas	50	Coal	140,000	40	5	Steel	54,500	February	August	Standard Steel
	15	Caboose	.....	28	2	St. Und'frame	40,300	July	September	Company Shops
Missouri Pacific	60	Caboose	.....	29	4 3/8	St. Und'frame	44,000	January	June	Am. Car & Fdy.
	500	Stock	80,000	40	0	Steel Frame	44,800	January	August	Gen. Amer. Car
	500	Hopper	140,000	40	5	Steel	53,900	January	August	Standard Steel
	250	S. S. Auto	80,000	40	6	Steel Frame	52,400	January	June	Mt. Vernon Car
	500	S. S. Auto	80,000	40	6	Steel Frame	49,800	January	July	Mt. Vernon Car
	500	S. S. Auto	80,000	40	6	Steel Frame	49,800	February	July	Mt. Vernon Car
	500	S. S. Auto	80,000	40	6	Steel Frame	49,800	February	July	Am. Car & Fdy.
	100	S. S. Auto	100,000	50	6	Steel Frame	61,200	January	August	Mt. Vernon Car
	150	S. S. Auto	100,000	50	6	Steel Frame	58,500	January	August	Mt. Vernon Car
	1,000	S. S. Box	100,000	40	6	Steel Frame	48,000	January	June	Am. Car & Fdy.
	300	Auto	80,000	40	6	St. Und'frame	49,100	January	May	Company Shops
	600	Box	80,000	36	4½	St. Und'frame	42,400	January	August	Company Shops
	350	Coal	100,000	40	0	St. Und'frame	45,800	January	October	Company Shops
	1,000	Hopper	140,000	.....		.....	.....	December	.....	Standard Steel
	625	Box	100,000	.....		.....	.....	December	.....	Am. Car & Fdy.
	625	Box	100,000	.....		.....	.....	December	.....	Mt. Vernon Car
	35	Caboose	.....	.....		.....	.....	December	.....	Am. Car & Fdy.
	20	Air Dump	.....	.....		.....	.....	January	.....	W. Wh. Scraper
Mobile & Ohio	3	Caboose	.....	.....		.....	.....	.....	1929	Company Shops
Monessen Southwestern	7	Flat (Bloom)	50-ton	36	0	Steel	76,200	May	October	Koppel
Monsanto Chemical Works	8	Tank	7,000g.	.....		Steel	42,000	.....	January	Am. Car & Fdy.
	2	Tank	4,215g.	.....		Steel	37,300	.....	January	Am. Car & Fdy.
	2	Tank	7,077g.	.....		Steel	42,520	.....	October	Standard Tank
Moss Tie Co	1	Box	.....	.....		.....	.....	August	.....	Mt. Vernon Car
Nashville, Chattanooga & St. Louis	150	Gondola	100,000	42	0	Steel	42,200	March	May	Pullman
	50	Hopper	100,000	34	9	Steel	46,700	March	September	Pullman
National Oil Co., Inc	6	Tank	8,000g.	28	0	Steel	41,600	July	July	Am. Car & Fdy.
	2	Tank	10,000g.	28	0	Steel	45,500	July	July	Am. Car & Fdy.
	2	Tank	8,000g.	28	0	Steel	47,600	July	September	Am. Car & Fdy.
Nevada Con. Copper Co	10	Hopper	60-ton	23	5¾	Steel	48,800	January	May	Koppel
New Cornelia Copper Company	10	Air Dump	80,000	26	0	Steel Frame	59,000	May	August	Lase Crane Eng.
	50	Ore	.....	.....		.....	.....	May	.....	Koppel
New Orleans & Northeastern	500	D. S. Auto Box	80,000	40	6	Steel Frame	47,600	October	Mar. '30	Am. Car & Fdy.
New Orleans Terminal Co	500	D. S. Auto Box	80,000	40	6	Steel Frame	47,600	October	Feb. '30	Am. Car & Fdy.
Newport Co	1	Tank	10,000g.	28	0	Steel	51,800	September	October	Am. Car & Fdy.
New York Central	1,000	D. S. Box	110,000	40	6	Steel	47,400	March	October	Am. Car & Fdy.
	500	D. S. Box	110,000	40	6	Steel	47,900	March	November	Merch. Despatch
	1,000	D. S. Auto-Box	110,000	40	6	Steel	54,000	March	.....	Merch. Despatch
	1,000	Gondola	140,000	50	0	Steel	51,300	March	November	Pressed Steel
	500	Gondola	140,000	50	0	Steel	.....	March	.....	Merch. Despatch
	500	Gondola	140,000	50	0	Steel	51,800	March	.....	Gen. Amer. Car
	300	Flat	110,000	42	1½	Steel	39,300	March	.....	Company Shops
New York, Chicago & St. Louis	500	D. S. Box	80,000	40	6	Steel	49,800	May	November	Standard Steel
	250	Gondola	110,000	48	6	Steel	48,400	May	October	Am. Car & Fdy.
New York, City of	2	Air Dump	60,000	32	0	Steel	31,672	March	June	Magor
New York, New Haven & Hartford	3	Flanger	.....	.....		.....	.....	.....	1929	Company Shops
	10	Caboose	.....	.....		.....	.....	.....	1929	Company Shops
Niacet Chemical Corp	1	Tank	8,000g.	31	6	Steel	35,000	September	December	Am. Car & Fdy.
Norfolk & Western	500	D. S. Box	100,000	40	6	Steel	50,700	May	Sept.-Dec.	Company Shops
	1,000	Hopper	115,000	30	3	Steel	42,000	October	Dec.-March	Ralston Steel
	1,000	Hopper	115,000	30	3	Steel	42,000	October	Dec.-March	Bethlehem
	470	Gondola	180,000	42	5	Steel	60,000	November	Jan.-March	Company Shops
	500	Hopper	115,000	30	0½	Steel	42,000	March	Apr.-Sept.	Va. Bridge & Iron
	500	Hopper	115,000	30	0½	Steel	42,000	March	Apr.-Sept.	Ralston Steel
North American Car Corp	5	Tank	6,000g.	27	6	Steel	44,100	November	December	Am. Car & Fdy.
	500	Tank	8,000g.	40	0	Steel	40,400	March	Aug.-Oct.	Pressed Steel
Northern Illinois Coal Corp	4	Dump	50 cu. yd.	36	0	Steel	56,200	August	November	Pressed Steel
Northern Pacific	300	Flat	100,000	52	0	Steel	48,000	May	November	Pressed Steel
	200	S. S. Auto	80,000	40	6	Steel Frame	48,900	April	October	Pac. Car & Fdy.
	300	S. S. Auto	100,000	50	6	Steel Frame	58,100	April	Nov.-Dec.	Pac. Car & Fdy.
	300	Gondola	140,000	42	0	Steel	56,900	March	October	Am. Car & Fdy.
	200	Gondola	140,000	42	0	Steel	55,300	March	September	Am. Car & Fdy.
Northern Refrigerator Car Co	200	Refrigerator	140,000	49	7 5/8	St. Und'frame	.....	1929	.....	Pullman
Northwestern Pacific	2	Caboose	.....	29	7	St. Und'frame	37,150	March	October	Company Shops
North Western Refrigerator Line	150	Refrigerator	80,000	32	9	St. Und'frame	55,000	April	September	Am. Car & Fdy.
	1	Refrigerator	80,000	30	9½	St. Und'frame	59,700	August	September	Am. Car & Fdy.
Oahu Railway & Land Co	56	.....	.....	.....		.....	.....	.....	1929	Company Shops
Pacific Fruit Express	400	Refrigerator	100,000	45	1¾	Steel Frame	63,000	October	Jan. '30	Pac. Car & Fdy.
Panama Railroad	7	D. S. Box	100,000	34	2½	St. Und'frame	40,000	October	Mar. '30	Company Shops
	5	D. S. Box-Ref.	100,000	31	5	St. Und'frame	50,000	October	Dec. '30	Company Shops
Panhandle Refining Co	10	Tank	80,000	.....		Steel	45,000	October	December	Gen. Amer. Tank
Paper Makers Chemical Co	2	Tank	8,000g.	31	6	Steel	43,500	October	November	Am. Car & Fdy.

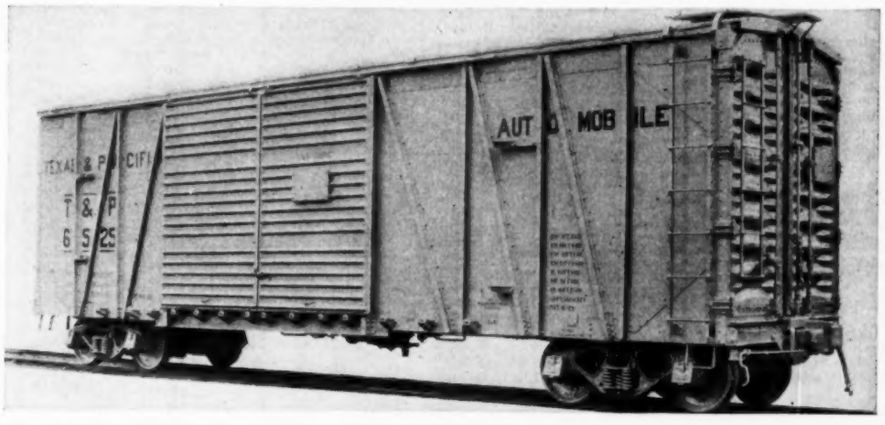
Purchaser	No.	Class	Capacity	Length Ft.	Length In.	Construction	Weight	Date of Order	Date of Delivery	Builder
Pennsylvania	1,000	S. S. Box	100,000	40	6	Steel	46,500	March	August	Company Shops
	1,000	S. S. Box	100,000	40	6	Steel	46,500	June	December	Pressed Steel
	900	S. S. Box	100,000	40	6	Steel	46,500	June	November	Am. Car & Fdy.
	800	S. S. Box	100,000	40	6	Steel	46,500	June	December	Ralston Steel
	700	S. S. Box	100,000	40	6	Steel	46,500	June	December	Pullman
	600	S. S. Box	100,000	40	6	Steel	46,500	June	December	Standard Steel
	1,000	S. S. Box	100,000	40	6	Steel	46,500	August	June '30	Company Shops
	1,000	S. S. Box	100,000	40	6	Steel	46,500	October	June '30	Bethlehem
	10	Flat	210,000	.....		Steel	104,500	April	September	Company Shops
	100	Flat	140,000	.....		Steel	53,500	April	September	Company Shops
	25	Flat	140,000	.....		Steel	63,500	July	November	Company Shops
	50	Caboose	.....	23	4	Steel	38,000	June	November	Company Shops
	30	Air-Dump	50-ton	32	4	Steel	69,100	June	November	Koppel
Pennsylvania Salt Mfg. Co.	5	Tank	7,000g.	27	6	Steel	42,000	November	December	Am. Car & Fdy.
	4	Tank	8,000g.	28	0	Steel	44,000	February	April	Am. Car & Fdy.
	1	Tank	60,000	42	3	Steel	32,750	August	August	Am. Car & Fdy.
	4	Tank	4,000g.	.....		Steel	.....	October	.....	Gen. Amer. Tank
Pennsylvania Tank Line	16	Tank	8,050g.	.....		Steel	40,000	Dec. '28	January	Pet. Iron Wks.
	3	Tank	8,050g.	.....		Steel	40,000	May	June	Pet. Iron Wks.
	3	Tank	8,050g.	.....		Steel	40,000	June	July	Pet. Iron Wks.
	4	Tank	8,050g.	.....		Steel	40,000	June	August	Pet. Iron Wks.

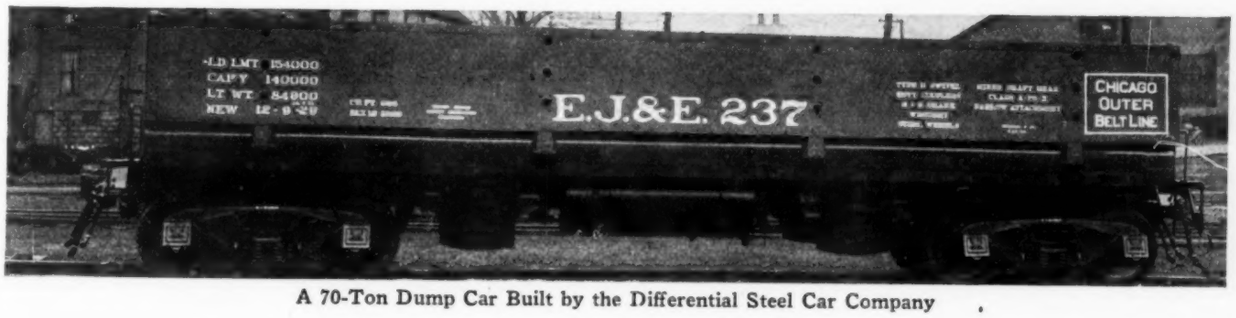
Gondola Car Built by the Greenville Steel Car Company—Load Limit, 155,900 lb.



A 55-Ton Steel Box Car Built by American Car & Foundry Company

A 40-Ton Automobile Car Built by the Pressed Steel Car Company





A 70-Ton Dump Car Built by the Differential Steel Car Company

Purchaser	No.	Class	Capacity	Length Ft.	Length In.	Construction	Weight	Date of Order	Date of Delivery	Builder
Pere Marquette	1,000	S. S. Box	80,000	40	6	Steel Frame	48,300	February	June-July	Pressed Steel
	400	Gondola	110,000	42	0	St. Und'frame	44,500	February	July-Sept.	Magor
	100	Ballast	100,000	33	1¾	Steel	46,700	February	June	Rodger Ballast
Phila. & Reading C. & I	10	Dump	80,000	28	5¾	Steel	38,200	August	December	Am. Car & Fdy.
Philadelphia Car Line Corp	6	Tank	8,000g.	28	0	Steel	44,200	August	August	Am. Car & Fdy.
Philadelphia Quartz Co	1	Tank	100,000	.....		Steel	.....	January	February	Gen. Amer. Tank
Philippine Railway	10	Box	30-ton	.....		Steel	.....	August	November	Koppel
Phillips Petroleum Co	10	Tank	11,000g.	36	0	Steel	70,400	June	October	Am. Car & Fdy.
	15	Tank	10,500g.	.....		Steel	74,600	.....	November	Company Shops
Pickands, Mather & Co	30	Air Dump	25 cu. yd.	.....		.....	.....	February	.....	W. Wh. Scraper
Pittsburgh & Lake Erie	100	Gondola	140,000	65	0	Steel	67,700	Dec. '28	August	Merch. Despatch
	500	Box	110,000	40	6	Steel	47,300	April	October	Standard Steel
	200	Gondola	140,000	65	0	Steel	67,700	November	Feb. '30	Merch. Despatch
	8	Air Dump	70-ton	.....		Steel	.....	August	1930	Koppel
Pittsburgh Steel Co	4	Air Dump	.....	.....		.....	.....	January	.....	Koppel
	10	Gondola	.....	.....		.....	.....	June	.....	Warren Tank Car
Reading	10	Caboose	.....	24	4½	Steel	44,300	August	December	Company Shops
	200	Gondola	140,000	61	0	Steel	66,600	August	December	Bethlehem
	5	Air Dump	50-ton	32	4	Steel	69,800	January	April	Koppel
	400	Box	100,000	.....		Steel	.....	December	.....	Pressed Steel
	400	Box	100,000	.....		Steel	.....	December	.....	Standard Steel
	600	Box	100,000	.....		Steel	.....	December	.....	Am. Car & Fdy.
	600	Box	100,000	.....		Steel	.....	December	.....	Bethlehem
Republic Iron & Steel Co	43	Gondola	70-ton	.....		Steel	.....	October	December	Koppel
Roebling's Sons Co., John A	12	Gondola	180,000	46	2¼	Steel	63,880	June	September	Am. Car & Fdy.
Safety Car H. & L. Co	1	Refrigerator	80,000	32	9⅜	St. Und'frame	54,600	June	June	Am. Car & Fdy.
	50	S. S. Refrig.	80,000	34	0⅜	Steel	58,000	September	.....	Pullman
St. Louis-San Francisco	300	Gondola	110,000	41	6	St. Und'frame	.....	1929	.....	Company Shops
	10	Box Cars	100,000	40	6	St. Und'frame	.....	1929	.....	Company Shops
	1,000	Box Cars	100,000	40	6	St. Und'frame	.....	November	.....	Pullman
	1,500	Box Cars	100,000	40	6	St. Und'frame	45,100	November	May '30	Am. Car & Fdy.
	300	Automobile	.....	.....		.....	.....	November	.....	Gen. Amer. Car
	700	Coal	100,000	41	6	St. Und'frame	43,000	November	.....	Pullman
St. Louis Southwestern	2	.....	.....	.....		.....	.....	.....	1929	Company Shops
Sand Springs	4	S. S. Box	80,000	40	6	Steel Frame	43,700	January	May	Gen. Amer. Car
Seaboard Air Line	500	S. S. Box	80,000	40	6½	Steel Frame	42,400	January	May	Standard Steel
	465	S. S. Box	80,000	40	6½	Steel Frame	42,400	May	July	Standard Steel
Shell Eastern Petroleum, Inc	15	Tank	10,000g.	.....		Steel	40,000	February	March	Am. Car & Fdy.
	5	Tank	8,000g.	.....		Steel	45,000	February	March	Am. Car & Fdy.
	50	Tank	8,000g.	.....		Steel	40,000	March	May	Am. Car & Fdy.
Shell Oil Company	10	Tank	6,500g.	31	0	Steel	.....	October	December	Gen. Amer. Tank
	20	Tank	8,000g.	32	0	Steel	.....	October	December	Gen. Amer. Tank
	70	Tank	10,000g.	32	0	Steel	.....	October	December	Gen. Amer. Tank
Shell Petroleum Corp	2	Tank	10,000g.	35	5	Steel	68,800	July	September	Am. Car & Fdy.
	1	Tank	100,000	35	5	Steel	68,800	Nov. '28	January	Am. Car & Fdy.
Shippers' Car Line	4	Tank	8,000g.	28	0	Steel	41,400	October	October	Am. Car & Fdy.
	21	Tank	10,000g.	28	0	Steel	45,000	October	October	Am. Car & Fdy.
	20	Tank	8,000g.	28	0	Steel	42,400	January	January	Am. Car & Fdy.
	1	Tank	8,000g.	28	0	Steel	41,200	February	March	Am. Car & Fdy.
	50	Tank	8,000g.	28	0	Steel	41,400	March	June	Am. Car & Fdy.
	2	Tank	8,000g.	28	0	Steel	41,200	April	April	Am. Car & Fdy.
	8	Tank	10,000g.	28	0	Steel	45,200	August	August	Am. Car & Fdy.
	50	Tank	8,000g.	28	0	Steel	42,000	August	September	Am. Car & Fdy.
	40	Tank	8,000g.	28	0	Steel	41,400	September	September	Am. Car & Fdy.
	20	Tank	8,000g.	31	6	Steel	41,000	October	November	Am. Car & Fdy.
	5	Tank	8,000g.	31	6	Steel	41,000	October	October	Am. Car & Fdy.
	5	Tank	8,000g.	31	6	Steel	41,000	October	October	Am. Car & Fdy.
Solvay Process Co	3	Tank	60,000	30	0	Steel	62,200	July	October	Am. Car & Fdy.
Southern	1,500	Hopper	110,000	34	1	Steel	42,800	October	Mar. '30	Pressed Steel
	1,000	D. S. Auto-Box	80,000	40	6	Steel Frame	47,6[illegible]	October	Jan. '30	Am. Car & Fdy.
Southern Cotton Oil Co	10	Tank	8,000g.	28	0	Steel	44,200	July	September	Am. Car & Fdy.
Southern Pacific	52	Caboose	.....	29	7	Steel Frame	37,150	March	October	Company Shops
	300	Flat	100,000	50	0	St. Und'frame	43,000	April	Jan. '30	Company Shops
	65	Gondola	100,000	48	0	Steel	50,600	March	November	Company Shops
	300	Logging	80,000	42	0	Steel	25,500	May	September	Company Shops
	20	Dump	30 cu. yd.	34	6	Steel	62,000	March	April	Magor
Spencer Kellogg & Sons, Inc	1	Tank	8,000g.	.....		Steel	41,900	May	July	Gen. Amer. Tank
Spokane, Portland & Seattle	5	Caboose	.....	30	0	Steel Frame	30,000	October	December	Gt. Nor. Shops
Standard Sanitary Mfg. Co	2	Hopper	60,000	25	3	Steel	36,000	September	December	Am. Car & Fdy.
Stauffer Chemical Co	1	Tank	10,000g.	31	3	Steel	56,900	October	December	Am. Car & Fdy.
	10	Tank	8,000g.	31	6	Steel	42,200	September	Feb. '30	Am. Car & Fdy.
Sun Oil Company	200	Tank	100,000	.....		Steel	46,500	January	March	Standard Tank
	100	Tank	80,000	.....		Steel	41,000	January	March	Standard Tank
	20	Tank	80,000	.....		Steel	40,000	January	March	Standard Tank
	20	Tank	80,000	.....		Steel	44,000	January	March	Standard Tank
	10	Tank	100,000	.....		Steel	58,500	September	October	Standard Tank
Tennessee Eastman	1	Tank	8,000g.	31	6	Steel	34,500	September	December	Am. Car & Fdy.
Texas & Pacific	250	Auto	100,000	50	8	Steel Und'frame	58,800	March	August	Am. Car & Fdy.
	50	Auto	100,100	50	8	Steel Und'frame	60,000	March	September	Am. Car & Fdy.
	700	S. S. Box	80,000	40	6	Steel Frame	50,700	March	Sept.-Nov.	Pressed Steel
	500	Stock	80,000	40	6	St. Und'frame	45,600	1929	.....	Pullman
Texas Company	300	Tank	10,100g.	.....		Steel	46,800	February	June	Pet. Iron Wks.
	275	Tank	10,000g.	28	0	Steel	46,100	February	March	Am. Car & Fdy.
	60	Tank	12,000g.	33	6	Steel	48,800	February	April	Am. Car & Fdy.
	15	Tank	12,000g.	33	6	Steel	51,300	February	June	Am. Car & Fdy.
	25	Tank	10,000g.	28	0	Steel	52,800	March	June	Am. Car & Fdy.
	4	Tank	7,700g.	33	7¾	Steel	50,370	November	December	Standard Steel
Tidal Refining Co	118	Tank	8,000g.	28	0	Steel	41,100	January	April	Am. Car & Fdy.
Timken Roller Bearing Co	1	Dump	100,000	40	0	Steel	80,600	January	April	Koppel
	10	Gondola	140,000	36	0	Steel	60,339	March	June	Am. Car & Fdy.
	1	Gondola	140,000	40	0	Steel	.....	Nov. '28	January	Canton Car
	2	Gondola	100,000	32	6	Steel	.....	February	May	Canton Car
Transcontinental Oil Co	2	Tank	6,000g.	.....		Steel	38,500	October	December	Penn. Car
Tucson, Cornelia & Gila Bend	75	Concentrate	120,000	25	2	Steel	48,000	April	November	Koppel
Union Carbide Co	2	Hopper	110,000	30	6	Steel	41,300	September	December	Pressed Steel
Union Oil Co. of Cal	5	Tank	6,500g.	29	9¼	Steel	48,000	February	May	Gen. Amer. Tank
	5	Tank	8,000g.	31	9¼	Steel	53,500	February	May	Gen. Amer. Tank
	40	Tank	10,000g.	31	9¼	Steel	60,000	February	April	Gen. Amer. Tank
Union Pacific	500	Automobile	100,000	50	8	Steel	62,000	May	November	Ralston Steel
Union Refrigerator Transit Co	50	Refrigerator	80,000	33	0	St. Und'frame	58,000	February	June	Am. Car & Fdy.
Union Tank Car Co	500	Tank	10,000g.	31	9½	Steel	50,000	November	June '30	Am. Car & Fdy.
	500	Tank	12,000g.	31	9½	Steel	52,000	November	Mar. '30	Am. Car & Fdy.
	300	Tank	8,000g.	31	9½	Steel	46,300	March	July	Am. Car & Fdy.
United Elec. Coal Cos	30	Hopper	80,000	28	5¾	Steel	38,200	March	.....	Am. Car & Fdy.
	1	Hopper	60,000	24	4	Steel	31,200	September	September	Am. Car & Fdy.
U. S. Government (Navy Dept.)	1	Gondola	100,000	41	0	.....	.....	May	.....	Mt. Vernon Car
	1	Flat	100,000	40	0	Steel Und'frame	38,870	October	December	Am. Car & Fdy.
	1	Flat	80,000	42	1½	Steel Und'frame	34,150	June	September	Am. Car & Fdy.
U. S. Government (Ordnance Dept.)	1	Powder	100,000	40	6	Steel	49,300	June	November	Am. Car & Fdy.
	1	Powder	100,000	40	6	Steel	49,748	June	November	Am. Car & Fdy.
	1	Projectile	100,000	40	6	Steel	49,300	June	December	Am. Car & Fdy.
	1	Projectile	100,000	40	6	Steel	49,748	June	November	Am. Car & Fdy.
	1	Fire Control	100,000	40	6	Steel	49,300	June	December	Am. Car & Fdy.
	1	Fire Control	100,000	40	6	Steel	49,748	June	December	Am. Car & Fdy.

Purchaser	No.	Class	Capacity	Length Ft.	Length In.	Construction	Weight	Date of Order	Date of Delivery	Builder
Utah Copper Company	100	Ore	195,000	24	5	Steel	54,800	June	September	Pressed Steel
	22	Dump	30 cu. yd.	34	0	Steel	78,900	April	August	Koppel
Van Camp Sand & Gravel Co	1	Air Dump	40-ton	25	8	Steel	54,500	June	June	Koppel
Vendome Tank Car Co	10	Tank	8,050g.	.....		Steel	40,000	May	July	Pet. Iron Wks.
Virginia-Carolina Chemical Corp	5	Tank	7,056g.	32	8½	Steel	41,300	May	July	Gen. Amer. Tank
	1	Tank	7,056g.	32	8½	Steel	41,300	October	December	Gen. Amer. Tank
Virginia Smelting Co	2	Tank	60,000	42	3	Steel	32,750	March	April	Am. Car & Fdy.
	2	Tank	60,000	42	3	Steel	32,750	April	May	Am. Car & Fdy.
Viscose Co	1	Topper	140,000	41	3	Steel	55,700	July	December	Standard Steel
Wabash	10	Caboose	.....	29	4⅛	St. Und'frame	41,500	March	August	Company Shops
Wagner Quarries Co	2	Air Dump	40-ton	25	8	Steel	50,600	July	July	Koppel
Warren Petroleum Co	100	Tank	8,000g.	31	6	Steel	48,200	October	December	Am. Car & Fdy.
Warren Tank Car Co	5	Tank	.....	.....		Steel	.....	July	.....	Standard Steel
Western Fruit Express	800	Refrigerator	75,000	33	2¾	St. Und'frame	56,500	March	October	Company Shops
	7	Refrigerator	75,000	33	2¾	St. Und'frame	56,500	March	June	Company Shops
	2	Refrigerator	75,000	44	0	St. Und'frame	71,800	Dec. '28	August	Company Shops
Western Pacific	50	Flat	50-ton	50	0	St. Und'frame	.....	February	June	Pac. Car & Fdy.
	50	Tank	12,500g.	.....		Steel	.....	February	1929	Gen. Amer. Tank
	150	S. S. Auto	50-ton	50	6	.....	....	February	1929	Pullman
	100	S. S. Auto	50-ton	50	6	.....	.....	.....	1929	Pullman
Western Refrigerator Line	500	Refrigerator	80,000	33	2⅜	St. Und'frame	55,000	May	September	Am. Car & Fdy.
Western Union Telegraph	5	S. S. Box	80,000	40	6	Steel Frame	31,600	February	May	Standard Steel
Wheeling & Lake Erie	1,000	Gondola	140,000	48	6	Steel	49,200	January	July	Standard Steel
	100	Flat	100,000	43	0	St. Und'frame	39,200	February	July	Standard Steel
Wichita Falls & Southern	15	Ballast	100,000	40	0	St. Und'frame	46,900	May	October	Am. Car & Fdy.
Wilson Car Lines	52	Refrigerator	80,000	.....		Steel Frame	54,000	.....	.....	Company Shops
Winston Brothers Co	150	Air Dump	.....	.....		.....	.....	September	.....	W. Wh. Scraper
Winston-Salem Southbound	25	Automobile	100,000	40	6	Steel	51,500	May	September	N. & W. Shops
	3	Caboose	.....	.....		Steel & Wood	.....	May	September	N. & W. Shops
Woodward Iron Co	1	S. S. Box	80,000	40	7	Steel	46,100	1929	.....	Pullman
Youngstown Sheet & Tube Co	2	Air Dump	50-ton	32	4	Steel	83,500	May	October	Koppel
	4	Air Dump	50-ton	32	4	Steel	83,500	August	November	Koppel
	2	Hopper	140,000	41	3	Steel	55,700	October	December	Standard Steel

Canada

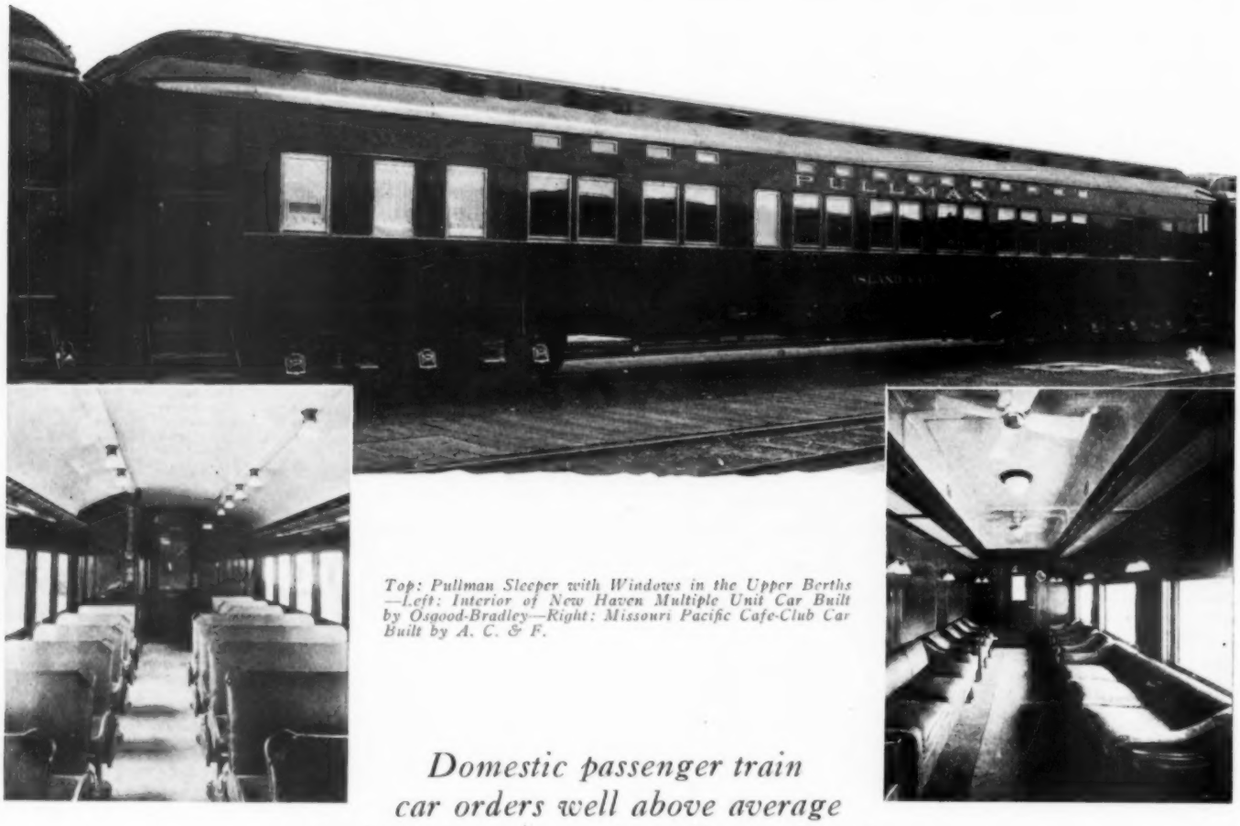
Purchaser	No	Class	Capacity	Length Ft.	Length In.	Construction	Weight	Date of Order	Date of Delivery	Builder
Beauharnois Light, H. & P. Co	60	Air Dump	20 cu. yd.	.....		.....	.....	December	.....	National Steel
Canada Starch	2	Tank	8,000g.	.....		Steel	43,000	October	November	Can. Car & Fdy.
Canadian Car & Foundry Co., Ltd	25	Tank	10,000g.	.....		Steel	57,200	November	Mar. '30	Company Shops
Canadian National	1	S. S. Box	100,000	40	6	Steel Frame	43,900	January	May	Can. Car & Fdy.
	2,250	Box	100,000	.....		.....	.....	December	.....	Can. Car & Fdy.
	25	Tank	10,000g.	.....		Steel	.....	December	.....	Can. Car & Fdy.
	1,175	Box	100,000	.....		.....	....	December	.....	National Steel
	1,000	Box	.....	.....		.....	.....	December	.....	Eastern Car
	200	Refrigerator	.....	.....		.....	.....	December	.....	Eastern Car
Canadian Pacific	5	Flat	100,000	41	7	Steel	46,700	Dec. '28	June	Company Shops
	6	Ore	130,000	34	0	Steel	78,000	Dec. '28	May	National Steel
	500	Flat	100,000	46	0	Steel	37,000	May	August	Can. Car & Fdy.
	640	D. S. Box	100,000	40	6	Steel	47,300	January	December	Eastern Car
	1,500	D. S. Box	100,000	40	6	Steel	47,300	January	December	National Steel
	2,060	D. S. Box	100,000	40	6	Steel	47,300	January	December	Can. Car & Fdy.
	100	Ore	150,000	25	11½	Steel	49,600	July	October	Can. Car & Fdy.
	50	Ballast	150,000	43	6	St. Und'frame	63,900	January	March	Can. Car & Fdy.
Dominion Bridge Co	4	Flat	40-ton	41	8	St. Und'frame	34,600	April	May	Can. Car & Fdy.
Frontenac Oil Co	25	Tank	10,000g.	32	5⅝	Steel	46,600	Dec. '28	February	Can. Car & Fdy.
	14	Tank	10,000g.	.....		Steel	46,600	March	April	Can. Car & Fdy.
	15	Tank	10,000g.	.....		Steel	46,300	April	May	Can. Car & Fdy.
	40	Tank	10,000g.	.....		Steel	57,200	November	Mar. '30	Can. Car & Fdy.
Imperial Oil Co	50	Tank	10,000g.	.....		Steel	66,300	November	Mar. '30	Can. Car & Fdy.
	40	Tank	10,000g.	.....		Steel	57,200	November	Mar. '30	Can. Car & Fdy.
	75	Tank	6,700g.	.....		Steel	44,000	November	Mar. '30	Can. Car & Fdy.
	35	Tank	10,000g.	.....		Steel	57,200	November	Mar. '30	Can. Car & Fdy.
Shawinigan Chemicals	2	Tank	6,000g.	.....		Steel	39,000	September	October	Can. Car & Fdy.

Export

Purchaser	No.	Class	Capacity	Length Ft.	Length In.	Construction	Weight	Date of Order	Date of Delivery	Builder
Andes Copper Co	2	Hopper	40-ton	.....		Steel	.....	January	April	Koppel
	10	Flat	40-ton	.....		Steel	.....	February	May	Koppel
	2	Hopper	40-ton	.....		Steel	.....	June	October	Koppel
Anglo-Chilean Cons. Nitrate Corp	100	Gondola	60,000	.....		.....	.....	April	.....	Magor
Anglo-Mexican Petroleum Co	6	Tank	10,000g.	.....		.....	.....	November	.....	Gen. Amer. Tank
	5	Tank	10,000g.	.....		.....	.....	November	.....	Gen. Amer. Tank
Asiatic Petroleum Corp	5	Tank	8,000g.	28	0	Steel	42,400	January	February	Am. Car & Fdy.
	15	Tank	10,000g.	28	0	Steel	46,900	January	February	Am. Car & Fdy.
	3	Tank	4,400g.	.....		Steel	.....	February	July	Koppel
Braden Copper Company	25	Flat	60,000	30	0	Steel Frame	10,000	July	September	Am. Car & Fdy.
	3	Tank	40,000	26	0	Steel	25,000	June	August	Gen. Amer. Tank
Canadian Johns-Manville	15	Dump	100,000	28	0	Steel	60,000	1929	October	Differential Steel
Cerro de Pasco Copper Corp	20	Hopper	100,000	.....		.....	.....	October	.....	Am. Car & Fdy.
Chile Exploration Co	20	Dump	100,000	34	0	Steel	80,000	1929	June	Differential Steel
	80	Ore	140,000	23	0	Steel	50,900	February	April	Pressed Steel
Cia Agricola y de Fuerza El	5	Flat	15-ton	.....		Steel	.....	May	September	Koppel
Colombian Government	30	Cattle	55,000	.....		Steel Frame	.....	Oct. '28	February	Koppel
Hudson Bay Mining & Smelt. Co., Ltd.	22	Air Dump	20 cu. yd.	.....		.....	.....	October	.....	W. Wh. Scraper
International Rys. of Cent. Am	25	Stock	50,000	36	0	Steel Frame	.....	January	April	Gregg
Interoceanic Ry of Mexico	*6	.....	.....	.....		.....	.....	.....	1929	Company Shops
Jackson, Sir John, Ltd	104	Air Dump	25-ton	.....		Steel	.....	May	August	Koppel
Ko-Pi Railway	30	S. S. Box	22,000	.....		Steel Frame	.....	May	October	Koppel
National Rys. of Mexico	1,200	S. S. Box	80,000	40	7	Steel	45,200	February	.....	Pullman
	600	D. S. Box	80,000	40	7	Steel	45,200	September	.....	Standard Steel
	240	D. S. Box	60,000	32	6	Steel	.....	September	.....	Standard Steel
	200	Gondola	100,000	38	4	Steel	....	September	.....	Standard Steel
	*31	.....	.....	.....		.....	.....	.....	1929	Company Shops
Pure Cane Molasses Co	6	Tank	4,000g.	.....		Steel	.....	June	October	Koppel
South Manchurian	30	Air Dump	35 cu. yd.	.....		.....	.....	February	.....	Magor
Tela Railroad	30	Fruit	.....	.....		Steel	.....	January	April	Koppel
	30	Fruit	.....	.....		Steel	.....	March	June	Koppel
Ulen & Co	8	Air Dump	30-ton	.....		Steel	.....	September	December	Koppel
United Fruit Co	20	Banana	40,000	31	2	Steel Frame	.....	February	April	Magor
	25	Banana	40,000	31	2	Steel Frame	.....	February	April	Magor
	6	Box	40,000	31	2	Steel Frame	.....	May	August	Magor
	1	Tank	40,000	26	0	Steel	.....	February	April	Am. Car & Fdy.
	100	Banana	60,000	.....		.....	.....	November	.....	Magor
	*92	Banana	.....	.....		.....	....	.....	1929	Company Shops

* Not included in totals.

Passenger Car Orders in 1929



Top: Pullman Sleeper with Windows in the Upper Berths —Left: Interior of New Haven Multiple Unit Car Built by Osgood-Bradley—Right: Missouri Pacific Cafe-Club Car Built by A. C. & F.

Domestic passenger train car orders well above average for last nine years—Canadian orders down

By Gardner C. Hudson
Associate Editor, *Railway Age*

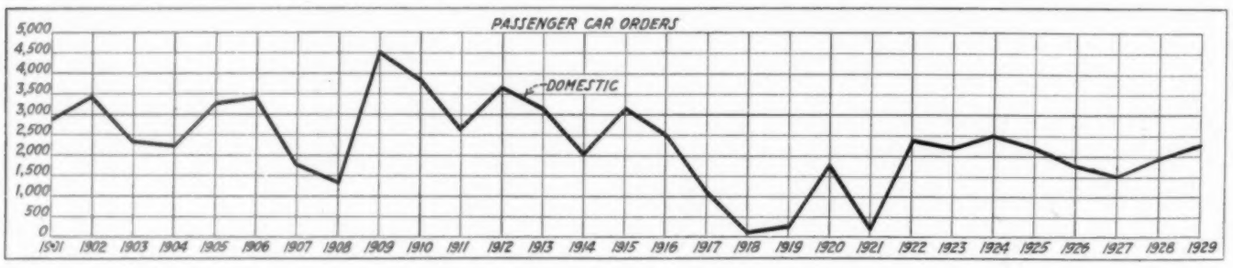
PASSENGER train cars ordered during 1929 for domestic use totaled 2,303, approximately 375 more than the 1928 figure of 1,930 cars, and more than that of any other post-war year except 1922 and 1924, when total orders were 2,382 and 2,554, respectively. It is also interesting to note that 1929 orders exceeded by over 20 per cent the average annual total of 1,864 cars ordered during the nine preceding years. The above figures do not include rail motor cars, which are discussed in a separate article.

On the other hand, only 122 passenger train cars were ordered during the year just past by Canadian roads for service in Canada. This figure is lower than that for any other year since 1919, with the exception of four, and is also considerably below the total of 334 cars ordered during 1928, the peak year since 1919. The Canadian Pacific was the largest purchaser.

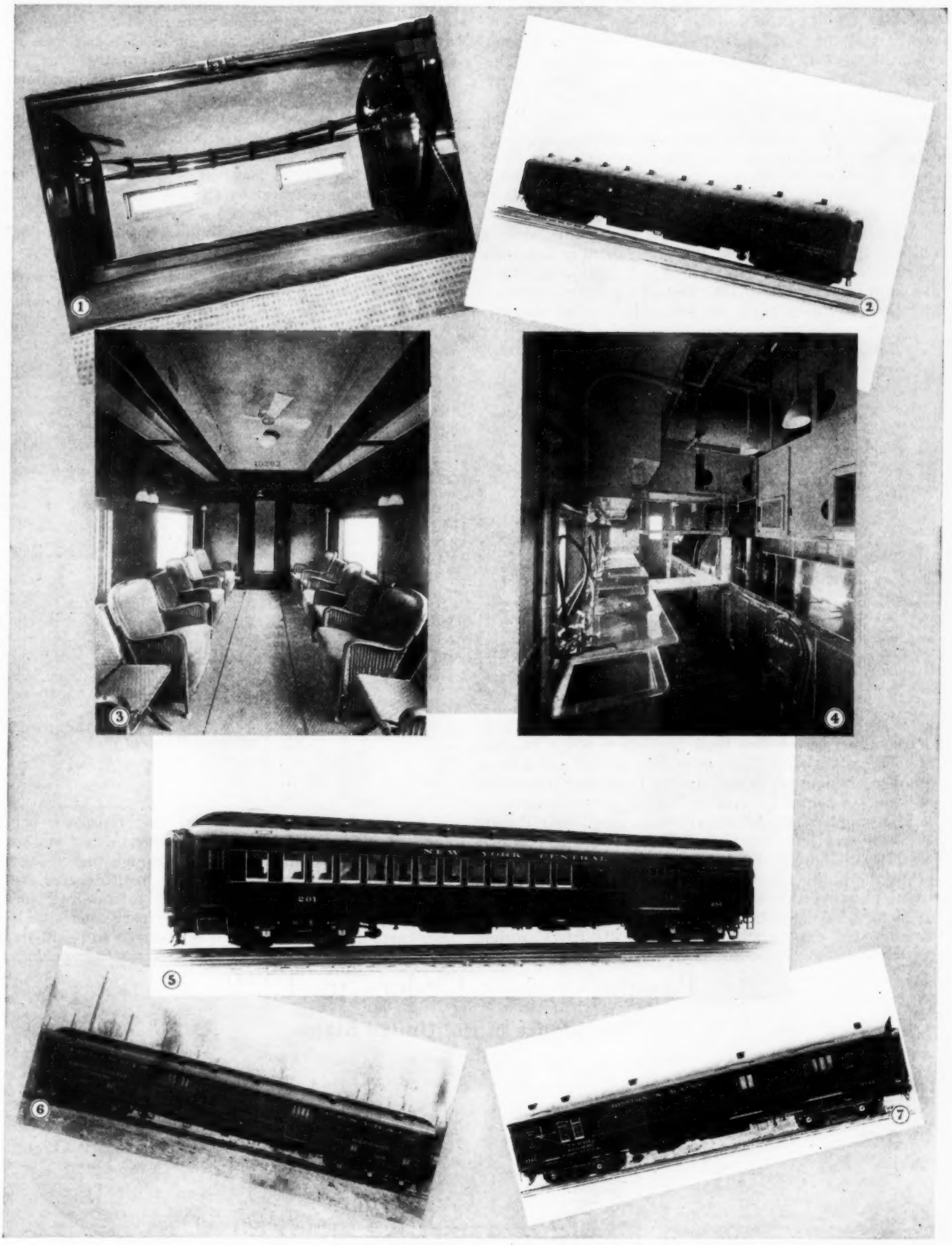
Passenger train car export orders amounted to 33, a slight advance over the 1928 figure of 29, but below the average for the nine years since 1919.

Table I—The Passenger Car Orders of 1929

For service in the United States	2,303
For service in Canada	122
For export to other countries	33
Grand total	2,458



Passenger Car Orders, 1901 to 1929



Some Examples of Passenger-Car Exteriors and Interiors Built during 1929

Fig. 1: Interior view showing upper berth windows in Pullman Sleepers—Fig. 2: Horse-baggage-automobile car built by the Bethlehem Steel Company—Fig. 3: Missouri Pacific dining-parlor car built by American Car & Foundry Company—Fig. 4: Kitchen of the Missouri-Pacific dining-parlor car—Fig. 5: Combination passenger-baggage car built by Pressed Steel Car Company—Fig. 6: Express-baggage car built by St. Louis Car Company—Fig. 7: Baggage-mail car built by Osgood Bradley Car Company.

The largest single order for passenger train cars in 1929 was placed by the Pullman Company, which ordered 497 sleeping cars and 60 cars of other types from the Pullman Car & Manufacturing Corporation. The New York Central Lines, with orders for 382 cars, were the largest railroad buyers, while the Delaware, Lackawanna & Western, which ordered 141 multiple-unit coaches, was the largest purchaser of passenger-carrying cars. Other large orders for passenger train cars came from the Northern Refrigerator Line, 200; the Baltimore & Ohio, 187; the New York, New Haven & Hartford, 136; and the Atchison, Topeka, & Santa Fe, 107.

After 228 cars had been bought in January, orders fell off sharply in the two following months and then rose to the 1929 peak of 250 in April. They continued at a high level throughout the rest of the second quarter, and then declined again in July. Except in August, when 149 cars were ordered, totals for the second half of the year were below those for the first six months, although a slight increase in orders placed and a large number of inquiries issued during December makes the outlook for the early part of 1930 a promising one.

Table II—Orders for Passenger Cars Since 1901

Domestic Orders Only

Year	Passenger cars	Year	Passenger cars
1901	2,879	1909	4,514
1902	3,459	1910	3,881
1903	2,310	1911	2,623
1904	2,213	1912	3,642
1905	3,289	1913	3,124
1906	3,402	1914	1,674
1907	1,791	1915	1,978
1908	1,319		

Year	Domestic and Foreign Domestic	Canadian	Export	Total
1916	2,302	...	109	2,411
1917	1,124	...	43	1,167
1918	9	22	26	57
1919	292	347	143	782
1920	1,781	275	38	2,094
1921	246	91	155	492
1922	2,382	87	19	2,488
1923	2,214	263	6	2,483
1924	2,554	100	25	2,679
1925	2,191	50	76	2,317
1926	1,868	236	58	2,162
1927	1,612	143	48	1,803
1928	1,930	334	29	2,293
1929	2,303	122	33	2,458

The number of passenger train cars built during 1929 for service in the United States was 1,254, which was slightly under the 1928 figure of 1,356, and also below the production totals for the five preceding years, when passenger train cars built varied from 1,507 in 1923 to 2,363 in 1925. Twenty cars were built in this country for export and 162 in Canada for Canadian service. As in the case of other equipment statistics, however, it is necessary to bear in mind the distinction between cars ordered and cars built.

The large volume of Pullman Company orders—nearly double its 1928 total of 244 and over five times its 1927 orders of 108—as well as the number of suburban coaches and other passenger cars ordered, indicates that the railroads are actively continuing their efforts to meet the requirements of increasing suburban traffic in the vicinity of large cities and to improve their through passenger trains by the use of superior equipment as well as by improved service.

The list of orders which follows has been compiled in the usual way, returns from the railroads being checked against and enlarged from lists of orders supplied by the car builders, largely through the co-operation of the American Railway Car Institute, and from reports of orders published weekly in the Equipment and Supplies column of the *Railway Age*. Unless otherwise noted, construction is assumed to be all-steel.

Table III—Passenger Cars Built in 1929

	United States	Canada	Total
Domestic	1,254	162	1,416
Foreign	20	...	20
	1,274	162	1,436

Comparison with Previous Years

Year	Domestic	Foreign	Total
1899	1,201	104	1,305
1900	1,515	121	1,636
1901	1,949	106	2,055
1902	From 1902 to 1907		1,948
1903	passenger car figures		2,007
1904	in these two columns		2,144
1905*	included in corre-		2,551
1906*	sponding freight car		3,167
1907*	columns.		5,457
1908*	1,645	71	1,716
1909*	2,698	151	2,849
1910*	4,136	276	4,412
1911*	3,938	308	4,246
1912†	2,822	238	3,060

* Includes Canadian output.
† Includes Canadian output and equipment built in company shops.

	United States			Canadian			Grand
Year	Domestic	Foreign	Total	Domestic	Foreign	Total	total
1913	2,559	220	2,779	517	....	517	3,296
1914	3,310	56	3,366	325	....	325	3,691
1915	1,852	14	1,866	83	....	83	1,949
1916	1,732	70	1,802	37	....	37	1,839
1917	1,924	31	1,955	45	....	45	2,000
1918	1,480	92	1,572	1	....	1	1,503
1919	306	85	391	160	....	160	551
1920	1,272	168	1,440	....	....	....	....
1921	1,275	39	1,314	361	....	361	1,675
1922	676	144	820	71	....	71	891
1923	1,507	29	1,536	....	....	....	....
1924	2,150	63	2,213	167	....	167	2,380
1925	2,363	50	2,413	....	....	....	....
1926	2,184	102	2,286	285	....	285	2,571
1927	1,785	50	1,835	126	....	126	1,961
1928	1,356	15	1,371	237	....	237	1,608
1929	1,254	20	1,274	162	....	162	1,436

Passenger Car Orders in 1929

For Service in the United States

Purchaser	No.	Class	Length Ft.	Length In.	Seating Capacity	Weight	Date of Order	Date of Delivery	Builder
Atchison, Topeka & Santa Fe	2	Dining	80	6	36	182,000	January	May	Pullman
	10	Chair-Smok.	78	8	76	158,200	April	September	Pullman
	10	Chair	78	8	76	158,200	April	August	Pullman
	10	Coach	78	8	80	159,000	April	September	Pullman
	10	Baggage	73	0	..	147,800	April	July	Pullman
	10	Mail & Bagg.	73	0	..	151,000	April	July	Pullman
	4	Mail & Bagg.	73	0	..	152,000	April	June	Pullman
	2	Business	52	0	..	147,200	July	November	Pullman
	10	Chair	78	8	76	156,500	October	.....	Pullman
	10	Smoking	78	8	85	155,500	October	.....	Pullman
	5	Dining	80	6	36	181,000	October	.....	Pullman
	2	Cafe-Obs.	79	8½	33	170,400	October	.....	Pullman
	8	Bagg. & Mail	73	0	..	152,000	October	.....	Pullman
	11	Pagg. & Mail	73	0	..	151,200	October	.....	Pullman
	3	Mail & Smok.	78	8	65	157,000	October	.....	Pullman
Atlanta & West Point	1	Bagg. & Mail	71	0	..	138,000	May	September	Am. Car & Fdy.
Baltimore & Ohio	5	Dining	81	7¼	36	170,500	March	December	Pullman
	100	Express	53	6	..	82,200	March	October	Standard Steel
	10	Bagg. & Mail	72	10½	..	139,500	March	November	Am. Car & Fdy
	15	Baggage	72	1½	..	134,300	March	November	Bethlehem
	7	Cafe-Parlor	81	8⅜	34	166,900	May	December	Pullman
	50	Coach	78	8⅜	80	153,900	November	Apr. '30	Pullman

Purchaser	No.	Class	Length Ft.	Length In.	Seating Capacity	Weight	Date of Order	Date of Delivery	Builder
Boston & Albany	1	Dining	74	4¾	36	.....	June	Jan. '30	Pullman
Boston & Maine	10	Bagg. & Mail	63	3	..	102,000	January	August	Osgood Bradley
Canadian National (U. S. Lines)	3	Parlor	81	0½	40	163,900	1929	.....	Pullman
Central of N. J.	1	Business	81	1½	..	195,900	1929	.....	Pullman
Chesapeake & Ohio	12	Express	70	8⅛	..	129,000	March	September	Pullman
	1	Business	80	10	..	186,500	1929	.....	Pullman
Chicago & Alton	2	Pass.-Mail	73	6	44	147,000	1929	.....	Pullman
	1	Bagg.-Mail	70	9	..	142,100	1929	.....	Pullman
	2	Postal	60	9½	..	130,700	1929	.....	Pullman
Chicago & Eastern Illinois	2	Pass. & Mail	81	7⅜	56	157,500	March	October	Pullman
Chicago & North Western	10	Baggage	73	8	..	137,000	January	June	Am. Car & Fdy.
	5	Pass. & Bagg.	76	6⅛	54	139,700	April	November	Pullman
	†† 24	Suburban	80	6½	98	97,800	June	November	Standard Steel
	†† 4	Comb. Sub.	80	6½	70	99,300	June	December	Standard Steel
	5	Horse	74	2¼	..	143,000	July	Jan. '30	Am. Car & Fdy.
Chicago Great Western	2	Mail & Bagg.	64	2	..	115,000	September	November	Pullman
Chicago, Milwaukee, St. P. & Pacific	10	Mail & Exp.	72	10	..	134,300	July	November	Company Shops
	15	.....	.....		..	.....	December	.....	Company Shops
Chicago, Rock Island & Pacific	5	Dining	80	6	36	175,100	January	July-Aug.	Pullman
	2	Parlor	76	7½	42	156,000	January	November	Pullman
	15	Suburban	70	0	100	95,300	January	July	Standard Steel
	5	Baggage	70	0	..	135,400	January	June	Am. Car & Fdy.
Cleveland, Cin., Chicago & St. Louis	20	Coach	70	0	85	131,000	May	Dec.-Jan.	Am. Car & Fdy.
	5	Pass. & Bagg.	70	0	50	127,000	May	December	Am. Car & Fdy.
Delaware & Hudson	3	Mail & Bagg.	65	0	..	120,700	March	August	Am. Car & Fdy.
	2	Mail & Bagg.	65	0	..	120,700	October	Feb. '30	Am. Car & Fdy.
Delaware, Lackawanna & Western	2	Mail & Bagg.	64	5	..	116,000	August	December	Am. Car & Fdy.
	1	Mail	64	5	..	116,000	October	Feb. '30	Am. Car & Fdy.
	141	M. U. Coach	71	0	84	147,000	October	May '30	Pullman
Denver & Rio Grande Western	2	Mail & Bagg.	71	0	..	140,200	October	Feb. '30	Am. Car & Fdy.
Denver & Salt Lake	1	Baggage	70	0	..	133,500	April	October	Am. Car & Fdy.
	1	Bagg. & Mail	70	0	..	140,200	April	October	Am. Car & Fdy.
Detroit & Mackinac	1	Bagg. & Mail	.....		..	.....	1929	.....	Bethlehem
Erie	10	Express	70	0	..	130,300	1929	September	Pullman
	12	Coach	75	9	88	103,800	April	September	Standard Steel
	18	Coach	75	9	88	103,800	April	October	Standard Steel
Georgia Railroad	5	Bagg. & Mail	71	0	..	138,000	April	September	Am. Car & Fdy.
Green Bay & Western	1	Mail & Bagg.	.....		..	.....	1929	.....	Company Shops
Great Northern	† 1	Heater	50	10	..	17,500	February	August	Company Shops
	† 7	Baggage	74	0	..	136,800	March	October	Company Shops
	† 5	Baggage	82	6	..	140,000	November	Jan. '30	Company Shops
	3	Dining	80	1½	36	181,200	July	December	Pullman
	2	Dining	80	1½	36	181,200	November	May '30	Pullman
Hocking Valley	3	Mail & Exp.	70	8⅛	..	129,000	April	October	Pullman
	2	Club-Dining	86	4 7/16	..	174,000	May	Jan. '30	Pullman
Illinois Central	10	Coach	72	0	88	137,800	March	October	Am. Car & Fdy.
	8	Chair	70	0	68	141,500	March	Oct.-Nov.	Am. Car & Fdy.
	6	Bagg. & Mail	70	9	..	139,600	March	December	St. Louis Car
	5	Baggage	70	9	..	133,800	March	November	St. Louis Car
	5	Horse	70	9	..	135,800	March	December	St. Louis Car
Lehigh & Hudson River	1	Bagg. & Mail	83	7	..	105,100	February	September	Bethlehem
Louisville & Nashville	4	Coach	70	0	82	144,900	January	September	Am. Car & Fdy.
	4	Coach	70	0	80	145,600	January	September	Am. Car & Fdy.
	4	Pass. & Bagg.	70	0	36	142,400	January	August	Am. Car & Fdy.
	4	.....	70	0	36	169,000	March	December	Am. Car & Fdy.
	6	Baggage	70	9	..	134,500	January	September	Pressed Steel
Manila Railroad	20	Coach	65	0	..	.....	May	.....	Am. Car & Fdy.
Michigan Central	4	Dining	83	6½	36	173,000	April	Jan. '30	Pullman
Minneapolis, St. P. & S. S. Marie	4	Buff.-Obs.	84	2¾	..	176,000	January	June	Pullman
Missouri-Kansas-Texas	1	Business	84	0	..	190,000	March	December	Company Shops
Missouri Pacific	11	Bagg. & Mail	73	10	..	145,000	January	June	St. Louis Car
	2	Bagg. & Mail	73	10	..	143,000	January	June	St. Louis Car
	13	Baggage	73	10	..	138,600	January	June	Am. Car & Fdy.
	11	Coach	79	1	77	151,100	January	August	Am. Car & Fdy.
	2	Cafe-Parlor	79	10	32	159,400	January	November	Am. Car & Fdy.
	1	Cafe-Club	78	11¾	60	154,000	January	September	Am. Car & Fdy.
	4	Dining & Par.	70	0	.	.....	December	.....	Am. Car & Fdy.
New York Central	5	Dining	82	2½	36	172,800	April	Jan. '30	Pullman
	10	Pass. & Bagg.	74	11¼	50	126,700	April	December	Pressed Steel
	20	Baggage	73	0¾	..	141,100	April	October	Am. Car & Fdy.
	† 30	Milk	52	3⅝	..	84,800	April	September	Merch. Despatch
	10	M. U. Coach	69	4½	100	130,300	May	Feb. '30	Standard Steel
	2	Business	81	6⅜	..	185,000	June	Mar. '30	Pullman
	† 275	Exp.-Refrig.	52	3⅝	..	94,900	Jan.-July	December	Merch. Despatch
New York, Chicago & St. Louis	8	Coach	76	11½	80	134,000	May	Jan. '30	Pullman
	3	Dining	80	8	..	168,000	May	Jan. '30	Pullman
	5	Baggage	63	11¾	..	108,000	May	November	Pullman
	2	Baggage	72	8¼	..	128,000	May	November	Pullman
	1	Mail & Bagg.	72	8¾	..	134,000	June	November	Pullman
	2	Cafe-Coach	83	11½	36	178,000	May	Mar. '30	Pullman
New York, New Haven & Hartford	3	M. U. Motor	79	7¼	120	176,000	May	December	Osgood Bradley
	6	M. U. Trailer	79	7¼	120	103,600	May	December	Osgood Bradley
	2	Dining	84	5	36	170,000	August	Mar. '30	Pullman
	8	Dining	84	5	42	170,000	May	Mar. '30	Pullman
	70	Coach	84	5½	80	125,000	June	Dec.-May	Osgood Bradley
	24	Smoking	84	5½	88	125,000	June	Feb.-Mar.	Osgood Bradley
	6	Smok.-Bagg.	84	5½	52	124,000	June	June	Osgood Bradley
	5	Mail & Bagg.	64	3⅛	..	120,000	June	Feb. '30	Bethlehem
	10	Baggage	64	3⅛	..	120,000	June	Feb. '30	Bethlehem
	1	Club	84	5½	84	123,000	July	December	Osgood Bradley
	1	Business	83	8	..	160,000	April	Jan. '30	Osgood Bradley
Norfolk & Western	10	Bagg. & Exp.	62	5¾	..	97,700	February	August	Bethlehem
	5	Bagg. & Mail	62	5¾	..	104,400	February	August	Bethlehem
	10	Box Exp.	42	3	..	50,600	July	November	Company Shops
Northern Pacific	10	Mail & Exp.	74	2¼	..	145,600	May	Nov.-Dec.	Am. Car & Fdy.
	9	Dining	.....		..	.....	December	.....	Pullman
Northern Refrigerator Line, Inc.	200	Exp. Ref.	50	0	..	.....	1929	1930	Pullman
Panama	2	.....	.....		..	.....	1929	.....	Company Shops
Pennsylvania	3	Dining	81	11	36	170,000	July	Apr. '30	Company Shops
	4	Cafe	79	11	54	143,200	July	May '30	Company Shops
	25	Horse Exp.	77	9	..	132,000	June	Mar. '30	Company Shops
Peoria & Eastern	4	Bagg. & Exp.	60	6	..	111,750	June	November	Am. Car & Fdy.
Pullman Company	497	Sleeping	.....		..	.....	1929	.....	Pullman
	60	Parlor, Observation, Parlor-Obs.	.....		..	.....	1929	.....	Pullman
Reading	2	.....	.....		..	.....	1929	.....	Company Shops
Reynolds, W. R.	1	Business	80	10	..	193,800	1929	.....	Pullman

†† Steel and aluminum.
† Steel underframe.

Purchaser	No.	Class	Length Ft.	In.	Seating Capacity	Weight	Date of Order	Date of Delivery	Builder
St. Louis-San Francisco	10	Baggage	70	0	..	135,000	November	.....	Am. Car & Fdy.
	10	Bagg. & Mail	70	0	..	138,000	November	.....	Am. Car & Fdy.
	3	Dining	.....		..	.....	December	.....	Pullman
Southern	13	Bagg. & Mail	.....		..	.....	December	.....	Bethlehem
	9	Bagg. & Mail	.....		..	.....	December	.....	Bethlehem
	1	Postal	.....		..	.....	December	.....	Bethlehem
Southern Pacific	10	Lounge	83	6	38	175,000	February	December	Pullman
	3	Observation	83	6	74	150,000	February	December	Pullman
	15	Chair	82	5½	56	158,000	May	November	Pullman
Spokane, Portland & Seattle	1	Dining	83	9¾	36	181,200	June	December	Pullman
Texas Mexican	1	Bagg. & Mail	70	0	..	132,800	November	.....	Bethlehem
Union Pacific	5	Dining	83	0	36	159,000	January	December	Pullman
	25	Coach	83	0	72	150,000	January	Oct.-Dec.	Am. Car & Fdy.
	25	Baggage	69	0	..	126,400	January	June	Standard Steel
	5	Horse-Bagg.	74	0	..	140,600	January	July	Bethlehem
U. S. Bureau of Fisheries	1	Live Fish	69	8¼	..	125,000	.....	.....	Bethlehem
Wabash	3	Bagg. & Mail	70	9¾	..	135,000	December	1930	Am. Car & Fdy.
Western Ry. of Alabama	2	Bagg. & Mail	71	0	..	138,000	May	September	Am. Car & Fdy.

Canada

Purchaser	No.	Class	Length Ft.	In.	Seating Capacity	Weight	Date of Order	Date of Delivery	Builder
Canadian National	† 15	Exp.-Ref.	41	1	..	89,500	January	June	National Steel
	20	Baggage	.....		..	.....	December	.....	National Steel
	15	Exp.-Ref.	.....		..	.....	December	.....	National Steel
Canadian Pacific	15	Lounge	83	10½	45	187,700	Nov. '28	May	Company Shops
	10	Night Sleeper	83	10½	..	182,500	Nov. '28	October	Company Shops
	15	Dining	83	10½	36	187,000	Oct. '28	May	Company Shops
	15	Coach	83	10½	76	166,200	Oct. '28	July	Company Shops
	2	Cafe-Parlor	83	10½	30	182,000	Nov. '28	September	Company Shops
	10	Bagg. & Slp.	83	10½	24	172,600	Nov. '28	May	Company Shops
	3	Official	70	1	..	170,200	Oct. '28	July	Company Shops
	1	Official	83	10½	..	188,400	June	November	Company Shops
Quebec Central	¶ 1	Coach	78	0	76	124,300	January	May	Company Shops

Export

Purchaser	No.	Class	Length Ft.	In.	Seating Capacity	Weight	Date of Order	Date of Delivery	Builder
Braden Copper Company	10	Passenger	24	0	..	17,590	July	October	Am. Car & Fdy.
International Rys. of Central America	8	Coach	50	0	..	.....	July	.....	Am. Car & Fdy.
Mexican Railway	†* 1	Mail & Bagg.	.....		..	79,200	October	Mar. '30	Company Shops
National Rys. of Mexico	5	Coach	50	9	50	62,000	March	.....	Pullman
	10	Coach	50	9	75	62,000	March	.....	Pullman
	* 2	.....	.....		..	.....	1929	.....	Company Shops

* Not included in totals. †Steel underframe. ¶ Steel frame.

Material and Supply Costs

(*Continued from Page 73*)

However, the tendency was substantially downward in the last quarter. The closing costs for 1929 ranged from 25.6 cents to 31.1 cents per lb. for sheet copper, 27.7 cents to 50.5 cents per lb. for copper tubing, 19.6 cents to 20.6 cents per lb. for copper wire and 15.3 cents to 20.2 cents per lb. for journal bearings. Lead, tin and zinc, like copper, also advanced, the closing prices of lead ranging from $6.63 to $7.60 per cwt.

Fire brick increased $2.50 per M on one road during the year and dropped $1.50 on another and ranged between $36 per M and $45.50 per M at the close. The closing prices of boiler lagging, which remained practically stationary throughout the year, ranged from 14 cents to 22 cents per sq. ft., while the closing prices of glass increased on two roads and remained stationary on 11 others, ranging from $4.91 to $7.37 per box.

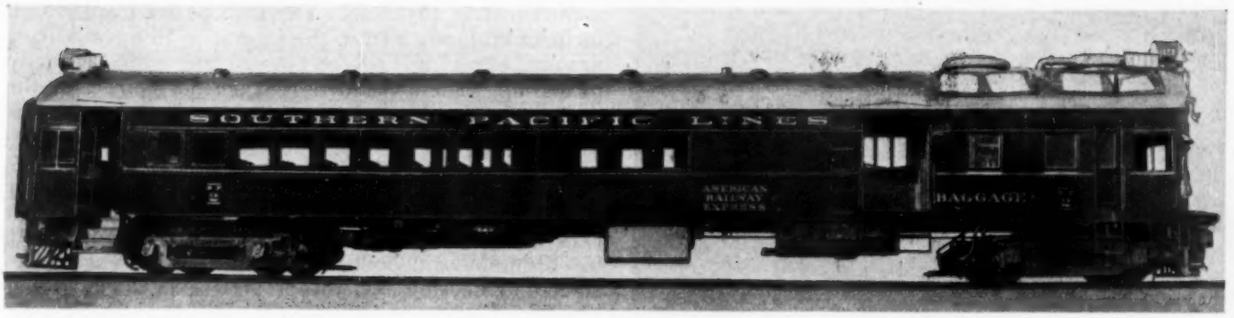
Two roads bought car oil for less in 1929 than in 1928 and one paid more. The closing prices on eleven roads ranged from 14 cents to 21½ cents per gallon. The closing prices of grease, which remained stationary on the majority of roads, ranged from 10 cents to 14½ cents per lb., while journal waste, which averaged less on the majority of roads throughout the year than in the previous year, ranged from 6½ cents to 12.7 cents per lb.

The general average of linseed oil prices on 13 roads was over 20 per cent higher than the previous year's prices and it cost the majority of roads more, the closing prices ranging from 11 cents to 15.8 cents per lb. White lead also averaged higher on the majority of roads and closed at prices ranging from 10 to 11.8 cents per pound. Sheet rubber remained practically stationary on all roads and closed at prices ranging from 19 cents to 38 cents per lb., while air hose, which was bought for lower prices by the majority of railroads, ranged, at the close, from 40 cents to 45 cents per pound.

The closing prices of leather belting ranged from 72 cents to $1.64 per foot. Those for manila rope, which cost three roads more and four roads less, ranged from 14½ to 26 cents per pound. There was little fluctuation in the price of sewer pipe throughout the year but it cost 20 per cent more than in the previous year and closed at prices ranging from 90 cents to $1.95 per foot.

Oxygen, Creosote, Cement

Four roads bought oxygen for less in 1929 and one road paid more, the closing costs ranging from 69 cents per 100 ft. to $1.35. Creosote oil was available at slightly lower prices last year and ranged from 11 cents to 16½ cents per gallon at the close. The railroads buy large quantities of hydrated lime and soda ash for water treatment. Last year the lime was bought cheaper on 4 of 12 roads, while soda ash continued about the same, the closing prices ranging from $8.50 to $12.10 a ton for lime and $26 to $30 for soda. Most of the roads bought cement cheaper last year as a result of price-cutting between members of the trust and the closing costs of this commodity to railroads ranged from $1.40 to $2.24 per barrel. Kerosene had a downward tendency during last year on a number of roads and closed at about 3 per cent lower than the previous year, the costs ranging from 6 cents to 11½ cents per gallon.



A Southern Pacific Car Equipped with Two 300-hp. Hall-Scott-Westinghouse Gas-Electric Power Plants—Car Built by the J. G. Brill Company

The 1929 Rail Motor-Car Orders

Capacity of engine units has reached 500 hp.—Trend continues toward greater power-plant capacities and weights

By C. B. Peck
Mechanical Department Editor, *Railway Age*

ORDERS for 159 rail motor cars and 11 trailers were placed with builders in the United States and Canada during the year 1929. Of this number 122 of the motor cars and 10 of the trailers were for service in the United States, 10 for service in Canada and 28, including one trailer, for export. The table below, which shows a comparison of the orders during the past year with those placed during preceding years, indicates that fewer rail cars were ordered last year than in any year since 1924.

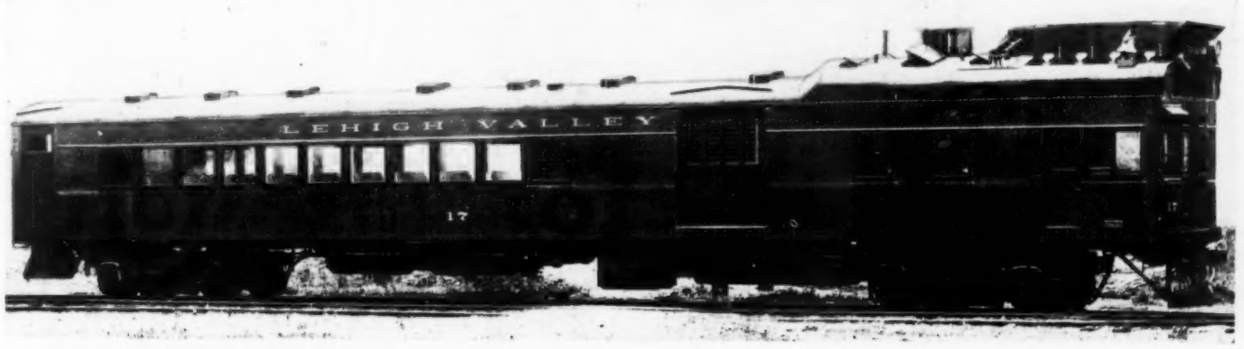
For the past three years attention has been called each year to the steady increase in the demand for heavier and more powerful rail motor cars. A comparison of the weights and power-plant capacities of the cars ordered last year with those ordered in 1928 shows no recession in this tendency. In 1928 but 27 per cent of the motor cars ordered for service in the United States and Canada were equipped with power plants exceeding 350 hp. in capacity. Last year the power plants of over 76 per cent of the cars ordered were rated at over 350 hp. In the case of the weights, 45 per cent of the motor cars ordered for service in the United States and Canada in 1928 weighed more than 125,000 lb. Last year 64 per cent of the cars ordered exceeded 125,000 lb. in weight and one group of seven cars weighed approximately 180,000 lb. each. These cars, each of which is powered with two 400-hp. engine-generator units, are in reality light locomotives which

Orders for Rail Motor Cars and Trailers

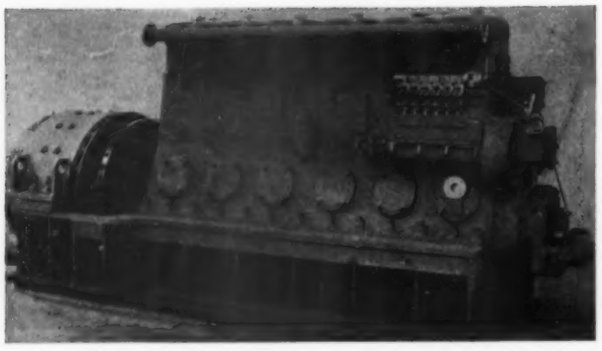
	1922	1923	1924	1925	1926	1927	1928	1929
For service in U. S.	51	77	120	149	142	180	175	132
For service in Canada	7	3	12	7	4	9	10	10
For export	1	22	..	34	32	12	9	28
Total	59	102	132	190	178	201	194	169
Motor cars	50	93	112	171	161	176	172	159
Trailers	9	9	20	19	17	25	22	11

Power Plant Capacity of Rail Motor Cars, U. S. and Canada

Horsepower	1925	1926	1927	1928	1929
100 or less	13	14	2	5	6
Over 100 to and including 125	5	7	..	1	3
Over 125 to and including 150	9	..	..	4	1
Over 150 to and including 175	20	1	..	1	..
Over 175 to and including 200	49	3	3	1	..
Over 200 to and including 250	36	65	43	13	2
Over 250 to and including 300	2	26	76	64	15
Over 300 to and including 350	..	..	..	30	2
Over 350 to and including 400	2	..	..	18	64
Over 400 to and including 450	..	8	7	6	2
Over 450 to and including 500	..	11	1	4	5
Over 500	..	..	8	15	30
Unclassified	..	..	24	1	2



A 600-hp. Motor Car With Electro-Motive Dual Power Plants—Built by the Osgood-Bradley Company



Westinghouse 400-hp. Solid-Injection Oil Engine

will be used as such in both passenger and freight service by the Chicago, Rock Island & Pacific. Because they are provided with 11-ft. baggage compartments, however, they may also be classed as rail motor cars and are an example of the possibilities for flexibility offered by internal-combustion power equipment.

The tendency toward the development of larger power-plant units continues. Designs for at least two eight-cylinder gasoline engines for rail-car service have now been developed which have horsepower ratings of 500 or over. The eight-cylinder 8-in. by 9-in. Sterling-Viking engine is designed to develop 500 hp. at a crank-shaft speed of 1,150 r.p.m. This engine weighs 7,850 lb. The designs for the new Brill eight-cylinder engine have been based on 8¾-in. by 10½-in. cylinders to develop a rated horsepower of 535 at a conservative crank-shaft speed of 950 r.p.m. This engine will weigh approximately 10,000 lb. The Brill power plant design includes an innovation in the form of a 15-hp. auxiliary gasoline engine, giving the power plant a total capacity of 550 hp. The investment cost per horsepower of the combined units is expected to be approximately the same as would be the case if the entire capacity were developed in the major unit.

Orders for 10 cars equipped with oil-electric power plants were placed during 1929. Among these are eight cars which are powered with a new six-cylinder, 9-in. by 12-in. Westinghouse solid-injection oil engine designed to develop 400 hp. at 900 r.p.m. The power plant for these cars, including the engine and generator, complete with the bed plate, weighs 18,000 lb. The engine, complete with flywheel and bedplate, weighs 11,000 lb.

It will be noted with interest that the steam power plant became a commercial factor in the rail-car field during the past year. Orders for five cars equipped with Railway Locomotor steam power plants developing from 400 to 500 hp. were placed during the year.

A list of orders for rail motor cars and trailers placed during 1929 follows.

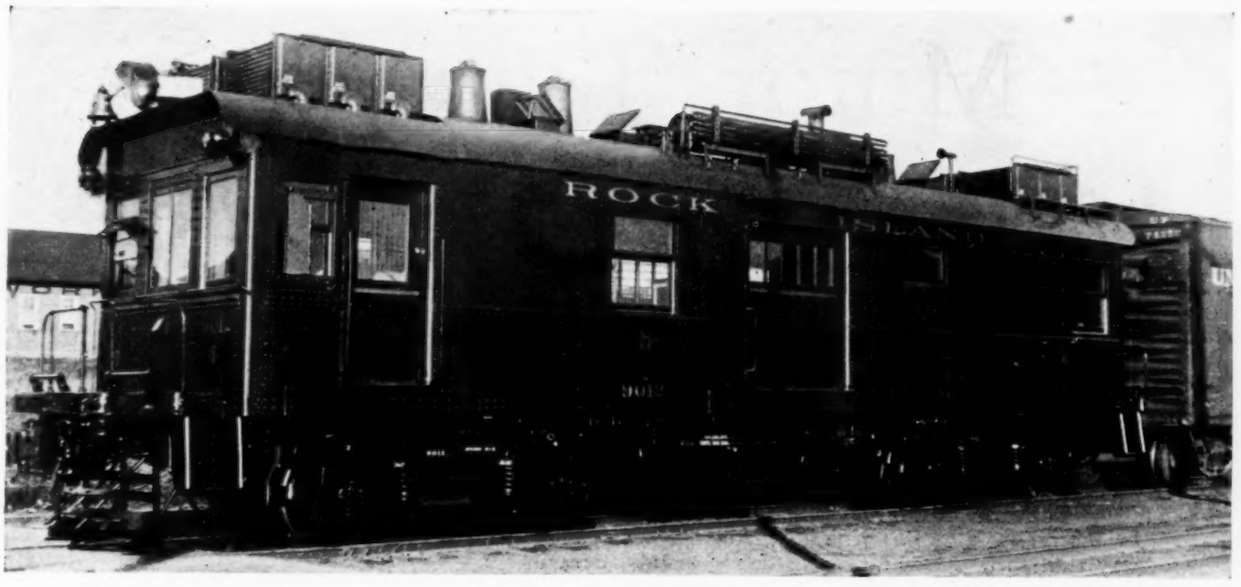
Comparison of Rail Motor Car Weights, U. S. and Canada

Weights	1925	1926	1927	1928	1929
25,000 and under	6	7	..	3	3
Over 25,000 lb. to and including 50,000 lb.	19	7	..	4	6
Over 50,000 lb. to and including 75,000 lb.	74	2	4	4	..
Over 75,000 lb. to and including 100,000 lb.	27	79	29	16	3
Over 100,000 lb. to and including 125,000 lb.	7	32	88	62	20
Over 125,000 lb. to and including 150,000 lb.	..	5	21	58	54
Over 150,000 lb. to and including 175,000 lb.	..	..	..	11	24
Over 175,000 lb.	..	1	..	..	7
Unclassified	..	..	26	5	13

Orders for Rail Motor Cars and Trailers

For Service in the United States

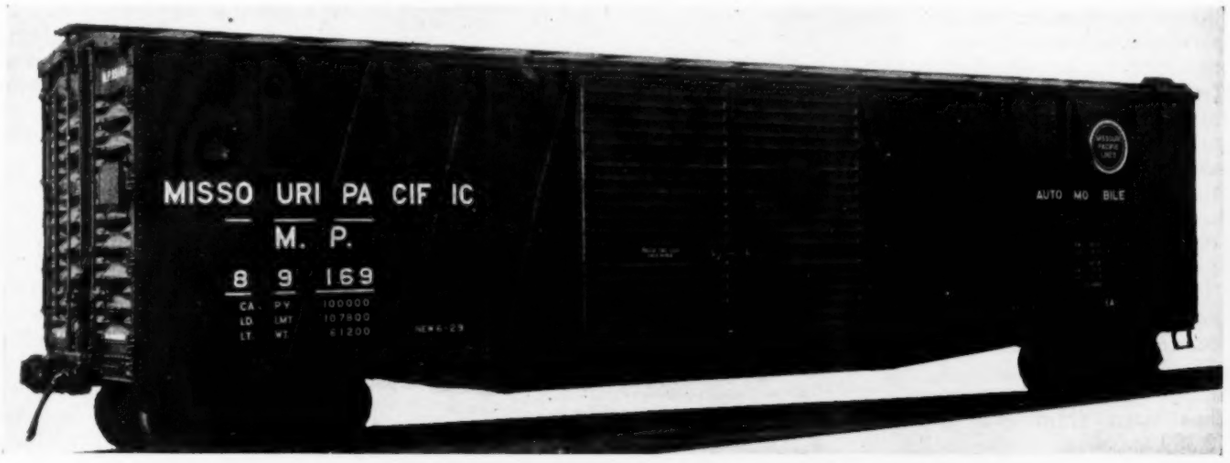
Purchaser	No.	Motor or Trailer	Type of power plant	Horsepower	Seating capacity	Length of bagg. compt. Ft.	In.	Weight	Builder
Atchison, Topeka & Santa Fe	11	Motor	Gas-Electric	400	57	15	2	133,100	Pull.-Elec.-M.
	8	Motor	Gas-Electric	400	35	20	1⅜	135,800	Pull.-Elec.-M.
	2	Motor	Gas-Electric	400	35	35	3	134,000	Pull.-Elec.-M.-West.
	1	Motor	Gas-Electric	400	35	20	1⅜	132,000	Pull.-Elec.-M.-West.
	1	Motor	Gas-Electric	400	57	.....		133,000	Pull.-Elec.-M.-West.
Chesapeake Beach	1	Motor	Gas-Electric	300	68	14	0	120,000	Brill-Hall-Scott-G.E.
Chicago, Burlington & Quincy	3	Motor	Gas-Electric	400	..	43	3¾	137,800	Pull.-Elec.-M.
	1	Motor	Gas-Electric	220	..	.....		92,000	Co. Shops-Elec.-M.
Chicago, Mil., St. Paul & Pacific	2	Motor	Steam	500	..	31	7	120,700	Ry. Loco.-Int. Har.
Chicago, Rock Island & Facific	7	Motor	Gas-Electric	800	..	11	0	179,300	St. Louis-Elec.-Mo.-G.E.
	2	Motor	Gas-Electric	400	30	31	0	120,000	St. Louis-Elec.-Mo.-G.E.
	1	Motor	Gas-Electric	400	30	31	0	120,000	St. Steel-Sterling-West.
	2	Motor	Gas-Electric	270	40	16	0	104,000	Cummings-Mack-Int.
	2	Motor	Gas-Electric	800	..	.....		.....	Elect.-M.-Winton-West.
Colorado & Southern	1	Motor	Gas-Electric	400	..	58	5½	140,000	Pull.-Elec.-M.
Detroit & Mackinac	1	Motor	Gas-Electric	300	..	.....		.....	Brill-Hall-Scott-West.
Erie	2	Motor	Gas-Electric	600	47	.....		.....	St. Steel-Sterling-G.E.
	2	Motor	Gas-Electric	600	..	57	6	.....	St. Steel-Sterling-G.E.
	1	Motor	Oil-Electric	600	..	57	3	.....	St. Louis-West.
Fernwood, Col. & Gulf	1	Motor	Gasoline	40	30	.....		13,000	J. G. Brill Co.
Great Northern	1	Motor	Gas-Electric	300	..	45	8	110,000	Brill-Hall-Scott-West.
	4	Motor	Gas-Electric	400	..	41	0	105,000	St. Louis-Elec.-M.
	1	Motor	Gas-Electric	400	..	26	0	110,000	St. Louis-Elec.-M.
	1	Tower Car	Gas-Electric	405	..	72	0	139,900	St. Louis-Mack-G.E.
Hartford Eastern	1	Motor	Gasoline	70	38	11	3	30,000	J. G. Brill Co.
Huntingdon & Broad Top	1	Motor	Gas-Electric	600	54	13	11½	150,175	Brill-Hall-Scott-G.E.
Lehigh Valley	1	Motor	Gas-Electric	220	66	.....		81,280	St. Louis-Elec.-M.
	1	Motor	Gas-Electric	600	21	34	7	152,300	Osgood Bradley-Elec.-M.
	1	Motor	Gas-Electric	600	51	17	1	154,200	Osgood Bradley-Elec.-M.
	3	Trailer	.....	...	103	.....		76,700	Osgood Bradley
	2	Trailer	.....	...	78	.....		66,280	Osgood Bradley
Minneapolis & St. Louis	3	Motor	Gas-Electric	300	32	22	1	116,000	St. Louis-Elec.M.
New York Central	1	Motor	Gas-Electric	350	58	28	8½	129,975	St. Steel-Sterling-West.
	1	Motor	Steam	450	..	.....		.....	Ry. Locomotor Co.
Northern Pacific	3	Motor	Gas-Electric	300	34	19	3	128,640	St. Louis-Elec.-M.-West.
	1	Motor	Gas-Electric	300	20	28	0	128,000	St. Louis-Elec.-M.-West.
	2	Motor	Gas-Electric	600	..	41	10	160,000	St. Louis-Elec.-M.-West.
	1	Motor	Gas-Electric	300	44	28	7	128,640	St. Louis-Elec.-M.-West.
	1	Motor	Gasoline	48.6	10	.....		12,000	Buda
Northwestern Pacific	2	Motor	Gas-Electric	400	34	15	0	154,000	Pull.-Elec.-M.
	2	Motor	Gas-Electric	600	34	14	7	158,000	Brill-Hall-Scott
Panama	1	Motor	Gasoline	123	30	10	0	25,000	Edwards-Buda
Pennsylvania	2	Motor	Gas-Electric	400	..	.....		120,000	Co. Shops-Elec.-M.
Railway Locomotor Co	2	Motor	Steam	400	..	31	7⅛	82,600	Pull-Ry. Locomotor
Reading	2	Trailer	.....	...	73	.....		68,000	Bethlehem
	1	Motor	Oil-Electric	330	34	14	¾	133,900	Westinghouse
	2	Motor	Gas-Electric	500	47	12	11½	156,720	Brill-Westinghouse
	1	Motor	Gas-Electric	500	32	21	2½	154,900	Brill-Westinghouse
	1	Motor	Gas-Electric	600	..	.....		.....	J. G. Brill Co.



A Motor Car Equipped With Two 400-hp. Electro-Motive Power Plants—Built by St. Louis Car Company

Purchaser	No.	Motor or Trailer	Type of power plant	Horse-power	Seating capacity	Length of bagg. compt. Ft.	In.	Weight	Builder
	1	Trailer	.....	..	73	.....		67,000	J. G. Brill Co.
	1	Trailer	.....	...	73	.....		65,500	J. G. Brill Co.
	1	Motor	Gas-Electric	...	..	.....		95,000	Beth.-Westinghouse
Richmond, Fredericksburg & Potomac	1	Motor	Gas-Electric	600	41	26	3½	146,000	Brill-Hall-Scott-West.
	1	Trailer	.....	...	100	.....		82,600	J. G. Brill Co.
St. Louis Southwestern	1	Motor	Gasoline	110	35	17	0	31,000	Brill-Hall-Scott
	1	Motor	Gasoline	110	25	22	0	31,000	Brill-Hall-Scott
Southern Pacific	6	Motor	Gas-Electric	400	34	15	0	154,000	Pull.-Elec.-M.
	7	Motor	Gas-Electric	600	54	.....		162,000	Brill-Hall-Scott-West.
Southern Pacific, Tex. & La	2	Motor	Gas-Electric	300	..	45	3	129,000	St. Steel-Sterling-West.
	6	Motor	Gas-Electric	400	..	42	0	135,000	Pull.-Elec.-M.-G.E.
Sperry Development Co	1	Motor	Gasoline	92	..	.....		44,000	Brill-Continental
Trinity & Brazos Valley	3	Motor	Gas-Electric	400	..	43	0	138,000	Pull.-Elec.-M.
Westinghouse E. & M. Co	1	Motor	Oil-Electric	400	..	.....		136,000	Company Shops
Yankton, Norfolk & Sou	1	Motor	Gas-Electric	...	..	.....		.....	J. G. Brill Co.
Canada									
Canadian National	1	Motor	Gas-Electric	135	..	.....		.....	Mack-International
	2	Motor	Gasoline	85	38	11	10	31,500	J. G. Brill Co.
	7	Motor	Oil-Electric	400	..	.....		141,000	Can. C. & F.-West.
Export									
Consolidated Railroads of Cuba	4	Motor	Gasoline	90	48	11	3	31,500	Brill-Hall-Scott
International Rys. of Cent. Am	1	Motor	Gasoline	...	..	.....		.....	J. G. Brill Co.
	1	Trailer	.....	...	..	.....		.....	J. G. Brill Co.
South Australian	11	Motor	Gasoline	190	50	16	3	57,000	Co. Shops-Brill-Winton
Uruguay Railways	2	Motor	Gasoline	85	38	11	10	31,000	J. G. Brill Co.
Victorian Rys	8	Motor	Gas-Electric	220	..	.....		.....	Co. Shops-Elec.-M.
	1	Motor	Gas-Electric	440	..	.....		.....	Co. Shops-Elec.-M.

* * * *



Single-Sheathed Automobile Car With End Doors—Built for the Missouri Pacific by the Mount Vernon Car Manufacturing Company

Motor Transport
Looms Larger in Railway Picture

Highway service of railroads widely extended during 1929—Many independent lines taken over

By John C. Emery
Motor Transport Editor, *Railway Age*

THE operation of motor coaches and motor trucks by the railways, and the co-ordination of highway transportation with railway transportation, received their greatest impetus during 1929. In no previous year had there been such general acceptance of motor vehicles as transportation equipment capable of rendering good service as auxiliaries of railway operations. Previously, a few railways had embarked upon programs of motor coach or motor truck operation on a system-wide basis, while many more had established isolated highway routes for experimental purposes; but not until 1929 did a large and impressive group of leading railways set about to use motor vehicles on a scale substantial in proportion to the size of their railway operations.

Table I—Growth of Railway Motor Coach Operation

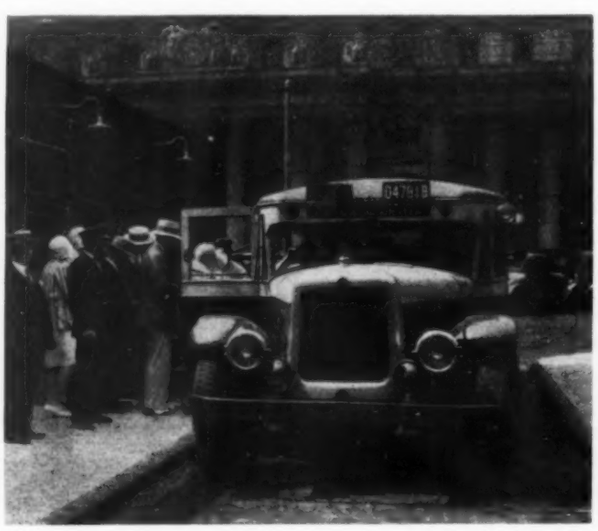
	1925	1926	1927	1928	1929
Number of Railways Operating Motor Coaches	10	25	52	64	78
Number of Motor Coaches Operated	300	450	800	1047	2389

Motor coach operation by steam railways has been a development of the last five years. Prior to 1925 there was almost no such service. The interval from 1925 to 1929, however, was marked by a steady, and in the last year rapid, increase in the use of motor coaches by the railways. Table I gives in statistical form a picture of the growth of the railways' motor coach services. These figures, particularly for the first two years, are necessarily approximate. From this tabulation it will be seen that in 1929 almost eight times as many railways were operating nearly eight times as many motor coaches as in 1925. The number of railways operating motor coaches has increased from 10 to 78, while the number of motor coaches operated has risen from 300 to 2,389.

The railways' use of motor trucks in freight transportation work dates back somewhat farther than their use of motor coaches for the handling of passengers. However, the co-ordination of motor truck service with railway service also has had its most rapid spread during the last five years. As indicated in Table II, 15 railways were using motor trucks in connection with their handling of freight in 1925, and were operating in that year approximately 900 motor trucks. In 1929, 55 railways were using 5,900 motor trucks, tractors, semi-trailers and trailers.

Table II—Growth of Railway Motor Truck Operation

	1925	1926	1927	1928	1929
Number of Railways Operating Motor Trucks, Tractors and Trailers	15	20	30	45	55
Number of Motor Trucks, Tractors and Trailers Operated	900	1600	3300	4900	5900



A Pennsylvania Motor Coach Leaving New York for Philadelphia

Trends in Railway Motor Transport

It is interesting to note the changes which occurred during 1929 in the trend of railway motor transport development. Mention has already been made of the change in the attitude of many railways, particularly toward motor coach operation. Prior to 1929 the majority of motor coach services established by the steam railways were of an experimental character. In 1929 however, very few experimental motor coach routes were established, nearly all routes put into operation last year having been parts of system-wide programs for motor vehicle operation. This is indicative of the fact that the motor coach has proved its capabilities, and that a sufficient background of experience in motor coach operation has been acquired to enable railways to forecast with a certain degree of accuracy the results which they will be able to secure from such operation.

Another interesting trend of the past year was the widespread absorption of independent motor coach lines by the motor coach operating subsidiaries of the railways. Literally dozens of indepen-

dent lines, some of substantial size, were acquired by the railways during the year just closed. Such acquisitions in general were rather expensive to the railways. However, they were necessary to a large degree, not because buying out independent lines made it possible to reduce competition, but because buying such lines enabled the railways to secure operating certificates, issued by regulatory commissions, without which the roads would not have been permitted to run motor coaches on the highways paralleling their railway lines.

One of the Union Pacific's Transcontinental Motor Coaches

The quickness of independent operators to apply for and secure motor coach operating certificates covering virtually all of the principal highway routes paralleling railway lines, and the disinclination of most state regulatory commissions to issue additional certificates covering these routes, has made the purchase of independent lines by the railways, in order to secure their operating certificates, almost a prerequisite to railway motor coach operation. In some instances, however, state regulatory commissions have permitted railways to operate motor coaches over routes already served by the motor coaches of independent companies, with the restriction that the motor coaches operated by the railways shall perform a station-to-station service only, without picking up or discharging passengers between the railways' own stations.

Transcontinental Service

Another noteworthy trend in 1929 was the development of long-distance motor coach service by railways. A number of railways seem to be departing from the original theory that the motor coach is useful only for short hauls, and that it must be tied in closely with the railways' trains. Such co-ordination of railway and highway service, in which motor coaches supplement or directly replace train service, did, of course, continue to be the outstanding feature of railway motor coach operation in 1929; but, on the other hand, an increasing number of railways established long-distance lines with a minimum of tie-up to their trains.

There are now several transcontinental motor coach lines owned outright or controlled to some extent by steam railways. The long-distance independent lines have enjoyed a considerable degree of success, and the establishment of their own long-distance highway routes by the railways is taken to indicate their acceptance of the motor coach not only as a useful means of replacement of expensive and unprofitable train service, but also as a means of attracting sufficient business on its own account to earn a profit.

Store-door collection and delivery of freight in connection with steam railway operation became a live issue in 1929. The advisability or inadvisability of a railway's providing for store-door collection and delivery of freight at the option of shippers has been a much argued point. The offering of such service by several leading railways in 1929 may or may not indicate a trend in the direction of a nation-wide, railway-operated, shipper-to-consignee l.c.l. freight service.

As in previous years, the railways during 1929 continued to carry on most of their motor truck operations by means of contracts with independent trucking companies. However, several railroads during 1929 established motor truck operations through subsidiary companies. Like the question of whether or not a railway should offer store-door collection and delivery for l.c.l. shipments, the question of whether a railway should establish its motor truck services through contractors or a subsidiary company is a much-argued point. The advocates of motor truck operation through a subsidiary company seem to have had a little the better of it in 1929.

Highlights of 1929

A few of the outstanding developments of the year in the railway motor transport field should be mentioned. One such development was the acquisition by the Pennsylvania, the Great Northern and the Southern Pacific of substantial interests in the independent motor coach operations of the Motor Transit Corporation and its affiliated companies, including the Greyhound, Pickwick, California Transit, Yelloway and other outstanding independent motor coach systems. The Pennsylvania acquired an interest in the Greyhound Lines operating east of Chicago and St. Louis, and through its subsidiary, the Pennsylvania General Transit Company, entered into contracts with the Greyhound Lines for the provision of co-ordinated motor coach service over certain routes paralleling its principal railway lines.

Two of the Central of Georgia's Motor Trucks

The Pennsylvania also acquired a large interest in three important motor coach lines operating in the vicinity of Philadelphia. The Southern Pacific joined with the independent companies in the formation of Pacific Transportation Securities, Inc., which is a

holding company for the independent lines operating in Southern Pacific territory, as well as the Southern Pacific Motor Transport Company, the railway's own motor coach operating subsidiary. The Great Northern, taking a financial interest in the Greyhound Lines, turned over the motor coach operation of its subsidiary, the Northland Transportation Company, to a new company, the Northern Greyhound Lines.

The Missouri Pacific expanded its motor coach operations with exceptional speed and now has well over four thousand miles of motor coach routes in regular daily operation. The St. Louis Southwestern likewise paralleled a large part of its railway mileage with motor coach and motor truck routes. The Burlington established the nucleus of an extensive system of motor coach lines, as did the Illinois Central, while the Rock Island recently took the first step in the formation of a motor coach service of its own.

The Union Pacific, with some previous experience in motor coach operation, in 1929 embarked upon an ambitious program for the establishment of highway routes. Following the purchase of important independent companies in Nebraska and in the Pacific Northwest, and the acquisition of several operating certificates directly from state commissions in its territory, it established two transcontinental motor coach routes. One of these extends from Chicago to Salt Lake City, Utah, where it splits, one line running to Portland, Ore., and the other line to Los Angeles, Cal. The other route extends from St. Louis, Mo., through Kansas City to Denver, Colo., where connection is made with the first route. The Chicago & North Western is participating in that part of the operation between Chicago and Omaha, Neb.

New Freight Services

Store-door collection and delivery service was established on certain of the lines of the Southern Pacific, by a contractor, the Pacific Electric Motor Transport Company, which is a subsidiary of the Southern Pacific-controlled Pacific Electric Railway. Previously, the Pacific Electric Motor Transport Company had established a highly successful store-door collection and delivery service on the lines of the Pacific Electric. The Texas & Pacific, likewise, organized a subsidiary, the Texas & Pacific Motor Transport Company, to provide store-door collection and delivery service for its shippers. The New Haven, the largest railway operator of motor coaches, in 1929 embarked upon an extensive program of motor truck operation. It now has 90 motor trucks in operation, working in co-ordination with its freight train service.

The Regulatory Situation

The regulatory situation remained practically at a standstill during 1929. The regulation of intrastate motor coach operators by state commissions is now general over the country, and some states are also regulating common carrier motor trucks. However, there is still no regulation of interstate motor vehicle operations, Congress having failed to act upon the several bills which have been proposed.

There is some confidence, however, that the present session of Congress will enact a bill providing for the regulation of interstate motor coach operations. The various interests concerned in the drawing up of regulatory legislation now appear to be in agreement as to the terms and provisions to be included, and this united support of the bill now pending may be effective in securing its early passage.

Orders for Motor Vehicles

Orders for 390 motor coaches, 1,764 trucks, 59 tractors, 31 trailers and 92 passenger automobiles were placed by steam railways, their subsidiaries and affiliated highway operating lines during 1929, according to replies received in response to questionnaires seeking such data. As stated in this connection last year, statistics continue fragmentary. In the first place vehicles, owned by contractors and employed exclusively in railway work, are not reported by the railroads. Furthermore many sales to railways are made by local dealers and are therefore not known to the manufacturers who also receive questionnaires. Replies to these latter are checked with the railway replies in order that the most accurate totals obtainable may be derived. The foregoing figures are the result and compare respectively with orders for 227 motor coaches, 68 trucks and 51 passenger automobiles during 1928. The great increase in the figure for freight vehicle orders in 1929 is due mainly to the inclusion for the first time of orders placed by the Railway Express Agency. In prior years this latter was a separate company but is now a wholly-owned joint enterprise of the steam railways. If 1929 Express Agency orders, totaling 1517 trucks and 43 tractors be omitted the comparison becomes one between the 68 trucks ordered in 1928 and 247 trucks, 16 tractors and 31 trailers (a total of 294 highway freight vehicles) ordered during 1929.

Orders for Highway Vehicles

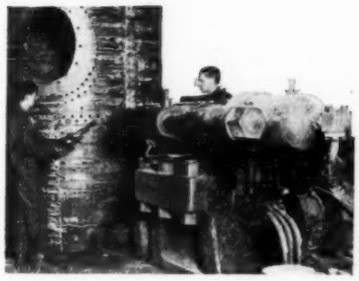
Railroad	No.	Type of vehicle	Model designation	Seating capacity or truck capacity in tons	Purchased by railroad or subsidiary *	Where to be used	Manufacturer
Atchison, Topeka & Santa Fe	1	M. Coach	Parlor	16	Subsidiary	Rev.	General Motors
	1	Truck	.....	3 ton	Subsidiary	Rev.	White
	1	Truck	.....	1½ ton	Subsidiary	Rev.	White
	1	Truck	.....	1 ton	Subsidiary	Rev.	White
	14	M. Coach	Model W	.....	Subsidiary	Rev.	Yellow
	20	Sedan	.....	.....	Subsidiary	Rev.	Cadillac
	3	M. Coach	Model 65	.....	Subsidiary	Rev.	White
Baltimore & Ohio	3	M. Coach	Parlor	16-21	Subsidiary	Rev.	A.C.F. Motors
	3	M. Coach	Parlor	12-20	Subsidiary	Rev.	A.C.F. Motors
	18	M. Coach	Parlor	1½ ton	Subsidiary	Rev.	Studebaker
	2	M. Coach	Parlor	16-21	Subsidiary	Rev.	Dodge-Graham
	2	M. Coach	Parlor	21	Subsidiary	Rev.	Yellow
	1	M. Coach	.....	17	Subsidiary	Rev.	Buick
	1	Truck	Parlor	14	Subsidiary	Service	Ford
	1	Passenger	Sedan	1½ ton	Subsidiary	Officers	Ford
	4	Truck	Freight	5	Railroad	Rev.	Ford
Boston & Albany	1	Truck	.....	3 ton	Railroad	Company	Reo
Boston & Maine	1	Truck	Model AA	1½ ton	Railroad	Shop	Ford
	2	Truck	Model AA	1½ ton	Railroad	M. of W.	Ford
	1	Truck	Model A	½ ton	Subsidiary	Service	Ford
	2	Truck	Beach	½ ton	Railroad	M. of W.	Ford
	1	Truck	.....	2½ ton	Subsidiary	Co. Business	General Motors
	1	Truck	Model T-30-C	1½ ton	Railroad	M. of W.	General Motors
	1	Coupe	612	.....	Railroad	Traffic	Graham-Paige
	1	Coupe	PS Pontiac	.....	Railroad	Traffic	Oakland
	1	Coupe	Marquette	.....	Railroad	Traffic	Buick

* Subsidiary includes affiliated company.

Railroad	No.	Type of vehicle	Model designation	Seating capacity or truck capacity in tons	Purchased by railroad or subsidiary	Where to be used	Manufacturer
Central of Georgia	1	Truck	Freight	3 ton	Railroad	Co. Business	White
	2	Truck	Freight	3 ton	Railroad	Co. Business	Int. Harvester
	1	M. Coach	Parlor	.....	Subsidiary	Rev.	Mack
Central of New Jersey	1	Truck	.....	4 ton	Subsidiary	Rev.	Mack
	1	Trailer	Model F-T	4-6 ton	Subsidiary	Rev.	East. Trailmobile
Chicago, Burlington & Quincy	19	M. Coach	Parlor	21	Subsidiary	Rev	General Motors
	2	M. Coach	Parlor	21	Subsidiary	Rev.	White
	3	M. Coach	Parlor	25	Subsidiary	Rev.	Studebaker
	2	M. Coach	Parlor	21	Subsidiary	Rev.	Studebaker
	1	M. Coach	Pass.-Mail	16	Subsidiary	Rev.	Mack
	2	M. Coach	Parlor	22	Subsidiary	Rev.	A.C.F. Motors
Chicago, Milwaukee, St. Paul & Pacific	2	M. Coach	Parlor-Bagg.	16	Railroad	Rev.	General Motors
	1	M. Coach	Parlor-Bagg.	16	Railroad	Rev.	White
Cincinnati, New Orleans & Texas Pacific	2	Passenger	Touring	5	Railroad	Co. Business	Chevrolet
	1	Passenger	Sedan	5	Railroad	Co. Business	Ford
	3	Passenger	Touring	5	Railroad	Co. Business	Ford
Clev., Cin., Chicago & St. Louis	1	Truck	.....	1 ton	Railroad	Company	.....
	2	Truck	.....	½ ton	Railroad	Company	.....
	1	Truck	.....	1¼ ton	Railroad	Company	.....
	1	Truck	.....	.....	Railroad	Company	.....
Copper Range	1	M. Coach	Parlor	21	Subsidiary	Rev.	White
Cornwall Railroad	1	Truck	Utility	1½ ton	Railroad	Co. Business	Chevrolet
Denver & Rio Grande Western	1	M. Coach	Pass. & Bagg.	21	Subsidiary	Rev.	White
	1	M. Coach	Pass. & Bagg.	15	Subsidiary	Rev.	Studebaker
	1	Truck	AA	1½ ton	Subsidiary	Rev.	Ford
	1	M. Coach	Pass. & Bagg.	25	Subsidiary	Rev.	Mack
	1	M. Coach	Pass. & Bagg.	14	Subsidiary	Rev.	Dodge
	1	Truck	No. 65	2½ ton	Subsidiary	Rev.	White
	1	M. Coach	Pass. & Bagg.	.....	Subsidiary	Rev.	General Motors
	2	M. Coach	Pass. & Bagg.	21	Subsidiary	Rev.	Mack
	2	Truck	BJ	¾ ton	Subsidiary	Rev.	Mack
	1	Truck	HS-74	3½ ton	Subsidiary	Rev.	Int. Harvester
	1	M. Coach	Pass. & Bagg.	.....	Subsidiary	Rev.	General Motors
Duluth & Iron Range	1	Truck	Dump Body	1½ ton	Railroad	Co. Business	Reo
	1	Truck	Sedan Delivery	½ ton	Railroad	Co. Business	Chevrolet
East Broad Top R. R. & Coal Co	1	Truck	Freight	2 ton	Subsidiary	Rev.	Dodge
	1	M. Coach	Parlor	21	Subsidiary	Rev.	Dodge
East Tennessee & Western N. C	1	M. Coach	Parlor	38	Subsidiary	Rev.	White
Fonda, Johnstown & Gloversville	5	M. Coach	City	.....	Railroad	Rev.	Mack
Great Northern	3	M. Coach	Parlor	14	Subsidiary	Rev.	Will Motor
	6	M. Coach	Parlor	29	Subsidiary	Rev.	Yellow
	13	M. Coach	Parlor	33	Subsidiary	Rev.	Will Motor
Illinois Central	1	M. Coach	Parlor	24	Subsidiary	Rev.	General Motors
Lehigh Valley	1	Truck	.....	½ ton	Railroad	Co. Business	Ford
	1	Truck	Stake Body	1½ ton	Railroad	Co. Business	Chevrolet
Lake Superior & Ishpeming	1	Truck	.....	1½ ton	Railroad	Co. Business	Chevrolet
Los Angeles & Salt Lake	1	M. Coach	Parlor	28	Railroad	Rev.	Fageol
	2	M. Coach	Parlor	18	Railroad	Rev.	General Motors
	5	Sedan	.....	5	Subsidiary	Rev.	Cadillac
	5	M. Coach	Parlor	14	Subsidiary	Rev.	White
	5	M. Coach	Parlor	14	Subsidiary	Rev.	Fageol
	5	M. Coach	Parlor	14	Subsidiary	Rev.	General Motors
	1	Truck	.....	3 ton	Subsidiary	Co. Business	White
	1	Truck	.....	3½ ton	Subsidiary	Co. Business	Mack
	2	Truck	.....	2½ ton	Subsidiary	Co. Business	Int. Harvester
	1	Truck	.....	1½ ton	Subsidiary	Co. Business	Chevrolet
	2	Truck	.....	1¼ ton	Subsidiary	Co. Business	Dodge
Missouri-Kansas-Texas	1	Truck	.....	1 ton	Railroad	Co. Business	Ford
	1	Roadster	.....	3	Railroad	Co. Business	Hudson-Essex
	1	Sedan	.....	5	Railroad	Co. Business	Studebaker
Missouri Pacific	1	Sedan	Model 66	5	Railroad	Co. Business	.....
	1	Sedan	Model 20/30	5	Railroad	Co. Business	.....
	1	Sedan	.....	5	Railroad	Co. Business	.....
	3	Sedan	Two Door	5	Railroad	Co. Business	.....
	3	.....	.....	5	Railroad	Co. Business	.....
	4	Touring	.....	5	Railroad	Co. Business	.....
	1	Touring	.....	5	Railroad	Co. Business	.....
	1	Coupe	.....	2	Railroad	Co. Business	.....
	1	Coupe	Sport	2	Railroad	Co. Business	.....
	1	Truck	.....	2½ ton	Railroad	Co. Business	.....
	4	Truck	.....	1½ ton	Railroad	Co. Business	.....
	3	Truck	.....	1½ ton	Railroad	Co. Business	.....
	1	Truck	.....	2½ ton	Subsidiary	Rev.	.....
	13	M. Coach	Parlor	16	Subsidiary	Rev.	.....
	29	M. Coach	Parlor	21	Subsidiary	Rev.	.....
	10	M. Coach	Parlor	29	Subsidiary	Rev.	.....
	10	M. Coach	Parlor	22	Subsidiary	Rev.	.....
	1	M. Coach	Pass. & Bagg.	20	Subsidiary	Rev.	.....
Monongahela	2	Truck	.....	1½ ton	Railroad	Rev. & Co. Bus.	Ford
New York Central	1	Truck	Stake Body	2½ ton	Railroad	Co. Business	General Motors
	1	Truck	Stake Body	1½ ton	Railroad	Co. Business	Reo
	1	Truck	Open	½ ton	Railroad	Co. Business	Ford
	1	Truck	Fire	.....	Railroad	Fire Fighting	Ford
	1	Passenger	Sedan	5	Railroad	Co. Business	Dodge
	1	Truck	Dump	1½ ton	Railroad	Co. Business	Chevrolet
	4	Passenger	Coupe	2	Railroad	Co. Business	Dodge
New York, New Haven & Hartford	7	M. Coach	Parlor	33	Subsidiary	Rev.	General Motors
	3	M. Coach	Parlor-Obs.	29	Subsidiary	Rev.	A.C.F. Motors
	15	Truck	.....	7 ton	Subsidiary	Rev.	Mack
	6	Truck	.....	4½ ton	Subsidiary	Rev.	Mack
	7	Truck	.....	7½ ton	Subsidiary	Rev.	White
	12	Truck	.....	6 ton	Subsidiary	Rev.	General Motors
	10	Truck	.....	7 ton	Subsidiary	Rev.	Int. Harvester
	8	Truck	.....	7 ton	Subsidiary	Rev.	Autocar
	2	Truck	.....	1 ton	Subsidiary	Service	Studebaker
	5	Truck	.....	½ ton	Subsidiary	Service	Ford
	1	Truck	.....	1½ ton	Subsidiary	Service	Ford
	10	Truck	.....	7½ ton	Subsidiary	Rev.	General Motors
	2	Truck	Panel	2 ton	Railroad	Company	Dodge
	1	Truck	Panel	½ ton	Railroad	Company	Ford
	1	Truck	Dump	2 ton	Railroad	Company	Dodge
	1	Truck	Panel	3 ton	Railroad	Company	Dodge
	2	Truck	Panel	2 ton	Railroad	Company	General Motors
	2	Truck	Panel	2 ton	Railroad	Company	Ford
Norfolk & Western	1	Truck	Enclosed	1 ton	Railroad	Co. Business	Dodge
Norfolk Southern	1	M. Coach	Parlor	29	Subsidiary	Rev.	Mack
Oahu Railway & Land Co	2	M. Coach	.....	35	Railroad	Rev.	Twin Coach

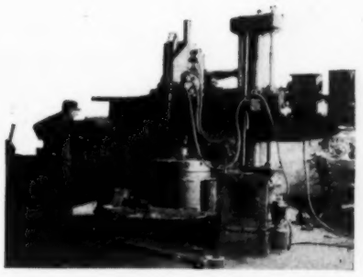
Railroad	No.	Type of vehicle	Model designation	Seating capacity or truck capacity in tons	Purchased by railroad or subsidiary	Where to be used	Manufacturer
Oregon-Washington	2	M. Coach	Parlor	37	Subsidiary	Rev.	Smith-Fageol
	3	M. Coach	Parlor	21	Subsidiary	Rev.	General Motors
	4	M. Coach	Parlor	26	Subsidiary	Rev.	Fageol
	2	M. Coach	Parlor	26	Subsidiary	Rev.	A.C.F. Motors
	9	M. Coach	Parlor	26	Subsidiary	Rev.	Fageol
	4	M. Coach	Parlor	26	Subsidiary	Rev.	White
	1	M. Coach	Parlor	25	Subsidiary	Rev.	White
	2	M. Coach	Parlor	26	Subsidiary	Rev.	Mack
	1	M. Coach	Parlor	26	Subsidiary	Rev.	Fageol
	1	M. Coach	Parlor	17	Subsidiary	Rev.	Fageol
	1	Truck	Delivery	.....	Subsidiary	Co. Business	Ford
	1	Truck	Delivery	.....	Subsidiary	Co. Business	Ford
Panama	2	Truck	Delivery	2 ton	Railroad	Rev.	White
Pennsylvania	2	Truck	.....	½ ton	.....	.....	.....
	5	Truck	.....	¾ ton	.....	.....	.....
	1	Truck	.....	1 ton	.....	.....	.....
	27	Truck	.....	1½ ton	.....	.....	.....
	3	Truck	.....	2 ton	.....	.....	.....
	7	Truck	.....	2½ ton	.....	.....	.....
	4	Truck	.....	3 ton	.....	.....	.....
	3	Coupe	.....	2	.....	.....	.....
	1	Roadster	.....	2	.....	.....	.....
	5	Phaeton	.....	5	.....	.....	.....
	9	Sedan	.....	5	.....	.....	.....
	3	Sedan	.....	7	.....	.....	.....
	2	Tractor	.....	.....	.....	.....	.....
Pittsburgh & Lake Erie	1	Truck	Stake Body	½ ton	Railroad	Co. Business	.....
	1	Truck	Stake Body	2½ ton	Railroad	Co. Business	.....
	1	Sedan	Four Door	5	Railroad	Co. Business	.....
Railway Express Agency	1070	Truck	.....	1 ton	.....	Rev.	.....
	13	Truck	.....	1½ ton	.....	Rev.	.....
	163	Truck	.....	2 ton	.....	Rev.	.....
	76	Truck	.....	2½ ton	.....	Rev.	.....
	129	Truck	.....	3½ ton	.....	Rev.	.....
	9	Truck	.....	5 ton	.....	Rev.	.....
	1	Tractor	.....	1 ton	.....	Rev.	.....
	42	Tractor	.....	5 ton	.....	Rev.	.....
	35	Truck	Electric	2 ton	.....	Rev.	.....
	22	Truck	Electric	3½ ton	.....	Rev.	.....
Reading	2	M. Coach	Club	29	Subsidiary	Rev.	Mack
	15	M. Coach	Club-Parlor	30	Subsidiary	Rev.	Mack
	4	M. Coach	Club-Parlor	35	Subsidiary	Rev.	General Motors
	1	Truck	Delivery	½ ton	Railroad	Co. Business	Dodge
	1	Truck	Delivery	1½ ton	Railroad	Shop	Mack
	1	Truck	Delivery	3½ ton	Railroad	Freight	Int. Harvester
	2	Truck	Delivery	1½ ton	Railroad	Shop	General Motors
	1	Truck	Delivery	1½ ton	Railroad	Freight	Ford
Richmond, Fredericksburg & Potomac	6	M. Coach	Parlor	29	Subsidiary	Rev.	A.C.F. Motors
St. Louis-San Francisco	1	Passenger	.....	29	.....	Co. Employees	.....
St. Louis Southwestern	2	M. Coach	Parlor	21	Subsidiary	Rev.	Studebaker
	8	M. Coach	Parlor	25	Subsidiary	Rev.	Yellow
	6	M. Coach	Parlor	21	Subsidiary	Rev.	Yellow
	2	M. Coach	Parlor	35	Subsidiary	Rev.	White
	5	M. Coach	Parlor	25	Subsidiary	Rev.	White
	7	M. Coach	Parlor	17	Subsidiary	Rev.	Yellow
	1	M. Coach	Parlor	21	Subsidiary	Rev.	White
	3	M. Coach	Parlor	12-16	Subsidiary	Rev.	.....
	1	Truck	Open	2 ton	Subsidiary	Rev.	Dodge
	6	Truck	Open	1½ ton	Subsidiary	Rev.	Ford
	3	Truck	Open	1½ ton	Subsidiary	Rev.	Chevrolet
	2	Truck	Open	2 ton	Subsidiary	Rev.	General Motors
	3	Truck	Open	3 ton	Subsidiary	Rev.	General Motors
	2	Truck	Closed	3 ton	Subsidiary	Rev.	General Motors
	1	Truck	Closed	3 ton	Subsidiary	Rev.	White
	2	Tractor	.....	2½ ton	Subsidiary	Rev.	White
	1	Tractor	.....	2½ ton	Subsidiary	Rev.	Mack
	5	Tractor	.....	3 ton	Subsidiary	Rev.	White
	3	Tractor	.....	3 ton	Subsidiary	Rev.	General Motors
	1	Tractor	.....	4½ ton	Subsidiary	Rev.	Mack
	2	Tractor	.....	2½-3 ton	Subsidiary	Rev.	.....
	15	Trailer	Closed	4 ton	Subsidiary	Rev.	Lapeer
	1	Trailer	Closed	4 ton	Subsidiary	Rev.	Fruehauf
	4	Semi-Trailer	Closed	7 ton	Subsidiary	Rev.	Fruehauf
	1	Semi-Trailer	Closed	10 ton	Subsidiary	Rev.	Fruehauf
	9	Semi-Trailer	.....	7 ton	Subsidiary	Rev.	.....
Southern	2	M. Coach	.....	10-12	Railroad	Co. Business	Ford
	1	Truck	Model AA	1½ ton	Railroad	Co. Business	Ford
Southern Pacific	2	Sedan	.....	6 cyl.	.....	.....	.....
	2	Sedan	.....	4 cyl.	.....	.....	.....
	11	Truck	.....	1½ ton	.....	.....	.....
	5	Coupe	.....	6 cyl.	.....	.....	.....
	4	Truck	.....	2 ton	.....	.....	.....
	2	Roadster	.....	4 cyl.	.....	.....	.....
	1	Truck	.....	3 ton	.....	.....	.....
	4	M. Coach	Parlor	.....	Subsidiary	Rev.	Fageol
	3	M. Coach	Street Car	37	Subsidiary	Rev.	Twin Coach
	1	M. Coach	Street Car	.....	Subsidiary	Rev.	A.C.F. Motors
	1	M. Coach	Parlor	17	Subsidiary	Rev.	General Motors
Spokane, Portland & Seattle	3	M. Coach	Parlor	34	Subsidiary	Rev.	Will Motor
Union Pacific	12	M. Coach	Parlor	21	Subsidiary	Rev.	Fageol
	39	M. Coach	Parlor	25	Subsidiary	Rev.	White
	10	M. Coach	Parlor	25	Subsidiary	Rev.	Mack
	3	M. Coach	Parlor	21	Subsidiary	Rev.	Studebaker
	5	M. Coach	Parlor	21	Subsidiary	Rev.	General Motors
	2	M. Coach	Parlor	25	Subsidiary	Rev.	A.C.F. Motors
	1	M. Coach	Parlor	12	Subsidiary	Rev.	Buick
	1	M. Coach	Parlor	14	Subsidiary	Rev.	Buick
	1	M. Coach	Parlor	21	Subsidiary	Rev.	General Motors
	2	M. Coach	Parlor	37	Subsidiary	Rev.	Twin Coach
	1	Truck	Pick-up	.....	Subsidiary	Co. Business	Ford
	1	Truck	Pick-up	.....	Subsidiary	Co. Business	Ford
	1	Truck	Tank	.....	Subsidiary	Co. Business	Ford

Shop Tools and Equipment Ordered During 1929



Order increases indicate a steady replacement of obsolete equipment

By W. J. Hargest
Associate Editor, *Railway Age*



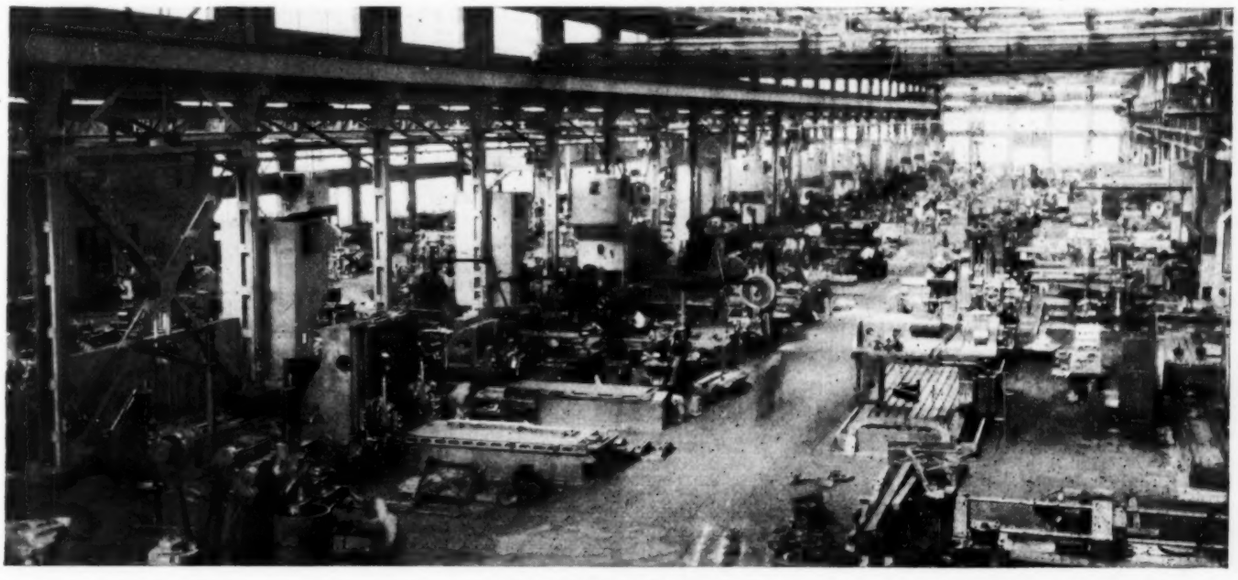
THE marked increase in the purchase of lathes, drill presses and material-handling equipment, including cranes, electric hoists and gas trucks, is the outstanding trend of the machine tool and shop equipment orders placed during 1929 and is indicative of a steady replacement program of obsolete equipment. During the last year 88 railroads, representing 89 per cent of the route mileage of the continent, placed orders for machine tool and shop equipment that totaled 2,691 units. This is an increase of 314 units over 1928 when 87 railroads, representing 85 per cent of the total route mileage, placed orders for 2,377 units of this type equipment. The orders placed during 1927 by 99 railroads, representing 88 per cent of the total route mileage, numbered 2,172 units while those placed during 1926 by 97 railroads, representing 84 per cent of the total route mileage, totaled 3,457 units.

The table, showing the fluctuations in the purchases of machine tool and shop equipment over a six-year period, reveals 1926 as the peak year when 3,457 units were ordered. The general industrial expansion of the south that resulted in the abnormal traffic demands on the southern roads was the principal factor responsible for the large orders of locomotives, cars and necessary maintenance equipment placed during 1926. With the return of normal conditions in 1927 the orders fell to 2,172 units. Since that time there has been a steady increase in purchases of this type equipment.

Many railroads which during the past few years have been relatively heavy purchasers of new cars and locomotives, have also been ordering a large amount of shop machinery and equipment. This indicates a realization of economies that can be effected in the maintenance of motive power and rolling stock by the utilization of modern shop facilities. Although one railroad reported the erection of new shops in 1929 that necessitated the purchase of 498 units of shop equipment, the general trend of orders placed during the past few years is indicative of the steady replacement of obsolete machine tools. This trend towards the elimination of obsolete tools and equipment is further indicated by the fact that most of the roads reporting large orders of such equipment have not built new shops during the past few years.

Trend of Six Years

An outstanding number of orders have been placed for the various types of lathes, drill presses, grinding



A Locomotive Machine Shop

machines, welding equipments and material-handling equipment. The total numbers of axle, engine, turret and wheel lathes ordered during 1924 to 1929, inclusive, were 363, 310, 395, 223, 189 and 240, respectively, of which 60 per cent were engine lathes. During the same period, orders placed for drilling machines numbered 178, 179, 296, 140, 94 and 162, respectively, of which number 66½ per cent were of types other than radial drill presses. The orders placed for all types of lathes in 1929 was 27 per cent greater than those placed in 1928 and purchases of drill presses for 1929 increased approximately 72 per cent over those for the preceding year. The total numbers of planers, shapers and slotters—standard railroad shop equipment—ordered during 1924 to 1929, inclusive, were 127, 104, 121, 77, 60 and 83, respectively, the purchase of 1929 representing an increase of 38 per cent over 1928. The purchases of boring mills have not fluctuated to any appreciable extent during the past few years while on the other hand milling machines ordered during 1929 increased approximately 35 per cent over those of 1928. Bolt cutters purchased in 1929 represented an increase of 59 per cent over the orders placed for this type machine in 1928.

Machine Tools and Shop Equipment Purchased Over Six-Year Period

	1929	1928	1927	1926	1925	1924
Lathes						
Axle	36	28	27	72	47	35
Engine	134	115	149	236	178	209
Turret	48	38	33	55	51	93
Wheel	25	11	14	32	34	26
Drill Presses						
Radial	42	31	48	93	65	71
Vertical and others	121	63	92	203	114	107
Planers	19	12	23	39	25	40
Shapers	53	42	46	75	70	74
Slotters	11	6	8	7	9	13
Boring Mills						
Horizontal	7	8	4	13	13	16
Vertical and others	53	46	49	93	56	64
Milling Machines						
Universal	4	5	8	26	15	18
Horizontal and others	35	24	19	37	23	32
Grinding Machines						
Cylindrical	8	13	10	20	9	13
Internal	13	27	32	20	36	20
Surface	27	10	10	22	14	17
Double end, tool and others	258	224	236	346	232	190
Metal cutting saws	35	29	31	68	40	36
Portable boring, facing and turning machines	30	34	29	80	58	51
Bolt threaders and cutters	43	27	30	54	53	54
Pipe cutters and threaders	50	35	45	66	40	42
Presses						
Wheel	13	4	17	24	22	20
Others	33	50	42	74	60	58
Hammers						
Steam	8	18	12	37	34	19
Other power	15	21	18	24	10	12
Forging Machines						
Bulldozers	5	2	9	5	6	11
Others	20	3	5	20	6	12
Punches	10	10	4	30	15	13
Shears	36	42	23	72	31	41
Combination punch and shear	16	16	20	39	33	22
Flue Shop Machinery						
Flue welders	7	9	12	16	7	22
Miscellaneous	20	14	24	11	19	32
Boiler Shop Machinery						
Flangers	6	9	4	17	21	17
Forming rolls	12	9	9	14	9	12
Riveters	37	7	5	15	8	..
Blowers	40	53	37	100	97	..
Furnaces						
Oil	52	64	53	68	63	..
Electric and others	118	43	27	18	96	..
Woodworking Machinery						
Boring machines	15	11	12	9	8	10
Mortisers	15	9	11	21	16	13
Surfacers and jointers	16	18	15	43	17	17
Tenoners	13	7	5	11	11	12
Wood cutting saws	31	33	57	93	64	62
Others	40	32	24	39	44	32
Overhead cranes	81	39	32	50	23	..
Car and loco. hoists and drop tables	65	60	63	24	14	..
Hoists						
Air	66	75	53	116	101	..
Electric	177	44	56	54	51	..
Chain	30	42	85	41	78	..
Trucks						
Electric	64	90	55	98	114	..
Gas	126	65	33	76	17	..
Trailers	157	395	132	135	85	..
Air brake test racks	10	30	43	28	24	..
Air compressors	66	52	64	82	54	..
Motors	124	101	122	138	27	..
Electric welders	96	72	46	158	110	..

The total number of orders for presses, hammers, forging machines, punches, shears and combination punch and shears, placed during the past six years were 208, 215, 325, 150, 126 and 155, respectively. There is an increase of 31 per cent for 1929 over 1928. The principal increase occurred in orders placed for forging machines. The orders for flue-shop and boiler-shop equipment have remained fairly constant over the period covered by the table, except in the case of riveters. The total orders placed for this type machine during 1929 is greater than the aggregate purchases of the preceding four years.

The railroads continue to purchase woodworking machinery in considerable quantities. During the past six years, beginning with 1924, the railroads ordered 146, 60, 216, 124, 110 and 130 units, respectively, of this type of machinery which includes borers, mortisers, surfacers, tenoners and saws. In spite of the steady growth in the number of modern steel passenger cars and freight cars, the small variations in the number of these machines ordered each year indicates that the railroads are steadily improving their wood mills.

Material-Handling Equipment

Orders for several types of material-handling equipment during 1929 show a marked increase over the purchases of 1928, while on the other hand orders for other types show a considerable decrease. Overhead cranes, car and locomotive hoists, gas trucks and electric hoists are in the former group. It is evident that the railroads are taking full advantage of the economies that can be effected by the utilization of modern equipment of this type. Orders placed for overhead cranes during 1929 increased 114 per cent over those placed during 1928. The orders for electric hoists and gas trucks placed in 1929 increased 300 per cent and 93 per cent, respectively, over the figures for the preceding year. As shown in the table, the orders for air and chain hoists, together with those for electric trucks, decreased as compared with the purchases of 1928.

* * *

The Grand Trunk Western's "New Yorker" Eastbound

Power Switch Machines and Signals to Direct Train Movements Eliminate Stops

Signaling Construction Increased During 1929

Much interest in remote power switches and direction of trains by signal indication—Excellent prospects for 1930—Train control quiet

By John H. Dunn
Signaling Editor, *Railway Age*

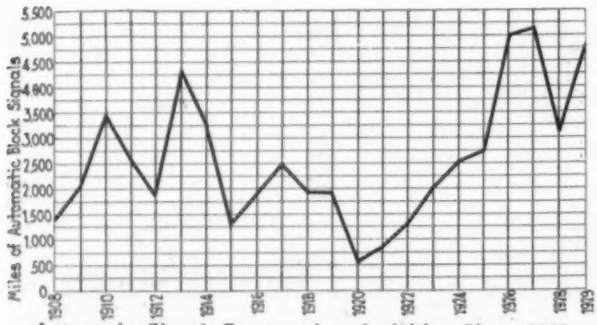
MORE automatic signals were installed on the railroads in the United States and Canada during 1929 than in 1928, and if interlocking, centralized-control, car retarders, etc., are included, the total amount of signaling equipment installed compares very favorably with the volume completed in 1927, the previous record year.

Automatic block signals were installed on 4,785 miles of road during 1929, as compared with 3,121 in 1928, and an average annual mileage for the last ten years of 2,505; the peak record being 5,127 miles in 1927. Over 2,501 automatic highway crossing signals were installed during the last year, as compared with 2,254 in 1928. The construction of interlockings was carried on actively, 99 new plants, involving 2,170 levers, being completed during 1929, as compared with 86 plants involving 2,314 levers in 1928. This slight decrease was more than offset by the increase in other applications of interlocking, for in this field should be included the automatic plants at railroad crossings, 61 of which were completed in 1929 as compared with 40 in 1928.

Likewise, the combination of interlocking and signaling, including the application of power switch machines for the operation of outlying switches, together with signals for directing train movements at such locations, has shown a decided increase; more than 122 such installations, involving 582 levers of this type of interlocking, were installed during 1929, an increase of 270 levers over that for 1928.

Another important feature included in the signaling field was the completion of car retarders at 12 yards during 1929, which involved 12,228 rail feet of retarders as compared with 4 such installations in 1928 involving 3,734 rail feet. The use of spring switches is also gaining favor, 159 such layouts being installed in 1929. It may be seen, therefore, that the total construction in the signaling field during 1929 not only showed an increase over that for the previous year, but, also, when taken as a whole, practically equalled that for 1927.

Although numerous important improvements have been made in equipment there were no outstanding developments in the signaling field during the last year. The two features of most significance were the extensive application of continuous cab signaling on the Pennsylvania, and several important installations of the centralized-dispatcher control system of operating switches and controlling the direction of train movements by signaling indication.



Automatic Signal Construction Activities Since 1908

In the strictly interlocking field, increased attention is being given to the use of simplified interlocking machines with no mechanical locking between the levers, the interlocking being accomplished electrically. A plant completed on the Michigan Central at Detroit, as well as one on the Chicago, Rock Island & Pacific at Blue Island, Ill., and the one under construction by the Big Four at Cleveland, Ohio, are typical of this development.

Automatic Block Signals Completed in 1929

Of the 4,785 miles of road equipped with automatic block signals in 1929, more than 3,733 miles was on single track, 988 miles on double track, 18 miles on three-track lines, and 46 miles on four-track lines. The Santa Fe equipped 537 miles of single track with signals, while the Southern Pacific was next in mileage with 498 miles, and the Missouri Pacific equipped 364 miles.

The double track mileage equipped with automatic signals in 1929 totalled 988 miles, the longest installation being 108 miles on the Canadian National between Danforth, Ont., and Belleville. The Pennsylvania made 10 different installations, totaling 174 miles on double track lines, while the Erie equipped two sections totaling 102 miles, and the Burlington made one installation of 80 miles. A total of 8,061 automatic block signals was installed during 1929, as compared with 5,536 in 1928, an increase of 2,425.

The increasing preference for light signals is indicated by the fact that of the signals installed last year, 5,883 were light signals and 2,178 semaphore. The greater portion of the semaphores were installed on five roads, the Santa Fe using 975, the Southern Pacific 597, the Louisville & Nashville 175, the Canadian Pacific 182, and the St. Louis-San Francisco 136; leaving only 101 semaphores installed on all other roads during the year. Of the light signals, 807 position-light type were installed on the Pennsylvania, 384 color-position-light type on the Baltimore & Ohio, and 4,734 color-light type on the remaining roads, the largest number on any one road being 888 on the Missouri Pacific Lines.

Interlocking Construction in 1929

The interlocking construction for 1929 included 99 new plants, of which 31 were mechanical, 49 electrical, 5 electro-pneumatic, and 14 electro-mechanical; a total of 2,170 levers being involved. At 67 other plants which were rebuilt, 403 new levers were added, making a total of 2,573 new levers of interlocking installed during 1929. The 713 power-operated switches included in these plants represent a considerable proportion of the cost. The largest plant completed during the year was the 151-lever electric plant on the New York Central at Collinwood, Ohio.

Increased interest is being shown in the installation of automatic signal protection at railroad grade crossings, termed automatic interlockings, 64 of these plants being completed in 1929 as compared with 40 in 1928. The Chicago & North Western installed five of these plants, and the Chicago, Milwaukee, St. Paul & Pacific and the St. Louis-San Francisco four each.

The railroads are continuing the installation of spring switches as a means of preventing train stops at the ends of double track, at yard leads, and at certain sidings where train movements predominate in one direction. A total of 159 spring-switch layouts were completed last year, the Santa Fe installing 31, the Southern Pacific 13, the Rock Island 11, and the Bingham & Garfield 10.

During 1929 several extensive installations of centralized-dispatcher control were completed, in which the passing track and junction switches are power-operated, and signals are used to direct all train movements, the

Table Showing Miles of Road Equipped with Automatic Signal Each Year for the Last 22 Years

Year	Miles of Road Construction of Automatic Block
1908	1,387.6
1909	2,047.1
1910	3,473.8
1911	2,623.4
1912	1,883.9
1913	4,350.5
1914	3,294.2
*1915	1,296.0
*1916	1,891.0
*1917	2,482.0
*1918	1,934.0
*1919	1,923.0
*1920	546.0
*1921	830.0
*1922	1,254.0
*1923	2,019.0
*1924	2,515.0
*1925	2,726.0
*1926	4,992.0
*1927	5,127.0
*1928	3,121.2
*1929	4,785

* Figures since 1915 are ours, and prior thereto figures are from I. C. C. reports.

Table A—Automatic Block Signals Completed During 1929

Road	Location	Miles of Road	Number of Signals	Manufacturer
A. T. & S. F.	Ottawa Jct., Kan. to Ottawa	0.9d	6c	Union
	Ottawa, Kan. to Richmond	15.2s	27s	Union
	White Eagle, Okla. to E.O.Jct.	57.5s	93s	Union
	Iola, Kan. to Chanute	16.8s	28s	Union
	Pueblo, Colo. to Bragdon	11.5s	25s	Union
	Ricardo, N. M. to Buchanan	25.8s	37s	Union
	Canyon, Tex. to Ft. Sumner, N. M.	140.6s	219s	Union
	Tangier, Okla. to Gage	14.1s	17s	Union
	Sears, Kan. to Casa, Colo.	193.0s	325s 6c	Union
	Shoemaker, N. M. to Watrus.	7.9s	4s	Union
	Gallinas, Colo. to Raton, N.M.	12.9d	23s	Union
	Wellington, Kan. to Attica	46.7s	82s 1c	Union
	Burrton, Kan. to Hutchinson	13.9d	12s	Union
	Goldwaite, Tex. to Mullens	11.0s	19s	Union
	Nicholls, Tex. to Revision	31.0s	54s	Union
	Escondido Jct., Cal. to DelMar	16.9s	36c	Union
	Atwood, Cal. to Fullerton	5.4s	10s	Union
B. & O.	Grafton, W.Va. to Parkersburg	90.0s 13.2d	210cp	Union
	Newark, Ohio to Columbus	33.2d	85cp	Union
	Akron Jct., Ohio to Warwick	15.6d	35cp	Union
	Patterson, W.Va. to McKenzie	6.1d	8cp	Union
	Cumberland, Md. to Keyser, W. Va.	22.0d	46cp	Union
B. & G.	Magna, Utah	0.5s	3c	G.R.S.
B. & M.	Chelmsford, Mass. to Aver	13.0d	44c	G.R.S.
	Hoosac, Mass. to No. Adams	8.0d	25c	Union
	Hoosick Jct., N. Y. to Eagle	3.0d	10c	Union
C. N.	Camrose, Alta. to Battle	0.9s	2s	G.R.S.
	Drumheller, Alta.	1.0s	2c	Union
	St. Fabien, P. Q.	2.5s	4c	G.R.S.
	Sackville, N. B.	0.3s	1c	Union
	Dalhousie, N. B.	3.3s	4c	G.R.S.
	St. Romauld, P. Q.	3.0s	2c	G.R.S.
	Berlin, N. H.	0.5s	1s	G.R.S.
	Windsor Mills, P. Q.	1.0s	1s	G.R.S.
	Danforth, Ont. to Belleville	108.0d	155c	G.R.S.
G. T. W.	Battle Creek, Mich. to Lansing	44.0d	49c	Union
C. P.	Vaudreuil, Que. to Mando	18.0s	25c	Union
	St. Martin Jct., Que. to Lanoraie	38.0s	54c	Union

Road	Location	Miles of Road	Number of Signals	Manufacturer
	Woodstock, Ont. to London	25.6s 1.0d	50c	Union
	Glen Tay, Ont. to Bowmanville	148.7s	234c	Union
	Newport N., Vt.	2.0s	2c	G.R.S.
	Ingolf, Ont. to Busteed	20.0s	13s	Union
	Broadview, Sask.	2.0s	3s	Union
	Pasqua, Sask. to Moose Jaw	7.3d	11s	Union
	Maple Creek, Sask. to Dunmore, Alta.	57.3s	86s	Union
	Spences Bridge, B. C. to North Bend	50.0s	69s	G.R.S.
C. of N. J.	Matawan, N. J. to Atlantic Highlands	10.6s	42c	Union
C. & O.	Blue Sulphur, W. Va. to Barboursville	2.0d	8c	Union
	Barboursville, W. Va. to Guyandot	6.0t	46c	Union
	Guyandot, W. Va. to Huntington	3.0f	18c	Union
C. & N. W.	Gladstone Pk., Ill. to Deval	7.0t	38c	G.R.S.
	Andrews, Neb. to Harrison	9.0s	2s	G.R.S.
C. & W. I.	Chicago to 87th St.	1.0d	1s	
C. B. & Q.	Mendota, Ill. to Galesburg	80.0d	219c	G.R.S.
C. M. St. P. & P.	Rondout, Ill. to Fox Lake	17.0s	34c	Union
	Tacoma, Wash. to Hillsdale	3.0s	2c	Union
C. R. I. & P.	Miscellaneous Locations	....	4c	Chicago
		....	6c	Union
C. I. & L.	Fogg, Ind. to Borden	13.0s	28s	G.R.S.
D. & R. G. W.	Swallows, Colo. to Florence	17.1s 2.2d	26c	G.R.S.
	Palisade, Colo. to Maxwell, Utah	183.9s	219c	G.R.S.
	Provo, Utah, to Midvale	*31.4s 2.3d	76c	G.R.S.
E. J. & E.	Spaulding, Ill	1.3s	2c	G.R.S.
Erie	Salamanca, N. Y. to Meadville, Pa.	19.5s 89.5d	166c	Union
	Hornell, N. Y. to Cuba Jct.	45.0s 12.0d	53c	Union
G. N.	St. Cloud, Minn. to Moorhead	165.2s	298c	Chicago
	Fraser Riv., B.C. to Sapperton	1.7s	6c	G.R.S.
	Berne, Wash. to Scenic	12.0s	18c	G.R.S.
I. C.	Ruslor, Miss. to Haleyville, Ala.	79.8s	111c	Union
I. R. T.	Grand Central to Times Sq.	0.5s	3c	Union
L. I.	Lynbrook, N. Y. to Baldwin	3.3d	8p	Union
	Freeport, N. Y. to Amityville	8.8d	22p	Union
	Brooklyn, N. Y. to East	2.4d	9p	Union
	Flushing, N. Y. to Bayside	1.6d	6p	Union
	Broad Channel, N. Y. to Hammel	1.3d	5p	Union
L. & N.	Wilhites, Ala. to Holmes Gap	7.0s	3s	
	Etowah, Tenn. to Junta, Ga.	88.6s	172s	Union
M.-K.-T.	Paola, Kan. to Centerville	30.9s	46c	Union
	Lindale, Mo.	5.5s	6c	Union
	Granger, Tex. to Sparks	14.5s	28c	Union
	San Antonio, Tex.	2.7s	2c	Union
	Waxahachie, Tex.	3.0s	2c	Union
M. P.	Urania, La. to Alexandria	46.0s	76c	G.R.S.
	Osawatomie, Kan. to Coffeyville	134.0s	237c	G.R.S.
	Valley Jct., Ill. to Bixby	9.3d	30c	G.R.S.
	Edgewater Jct., Kan. to Atchison	*45.0s	140c	G.R.S.
	Little Rock, Ark. to East Little Rock	1.5d	8c	G.R.S.
	Allenton, Mo. to Pacific	5.0d	9s 10c	H.B.& R.R.S.
I. & G. N.	Palestine, Tex. to Longview	81.0s	146c	G.R.S.
	Percival, Tex. to Spring	19.0s	30c	G.R.S.
	Camp Mabry, Tex. to San Marcos	35.0s	68c	G.R.S.
G. C. L.	DeQuincy, La. to Kinder	35.0s	64c	G.R.S.
	Gulf Coast, Tex. to Fullerton	36.0s	61c	G.R.S.
H. B. & T.	Houston, Tex. to Percival	2.5s	9c	G.R.S.
N. Y. C.	Garrison, N. Y. to Beacon	10.2f	40c	G.R.S.
	Wayneport, N. Y. to Palmyra	10.4f	24c	G.R.S.
	W. Haverstraw, N. Y. to Iona Island	2.8d	5c	G.R.S.
	Unionville, N. Y. to Voorheesville	2.2d	5c	G.R.S.
	Bergen, N. Y. to S. Byron	4.8f	14c	G.R.S.
	No. Buffalo, N. Y. to M.P. 7.4	1.8d	4c	G.R.S.
	Yosts, N. Y. to M.P. 192.3	1.6f	6c	G.R.S.
C.C.C. & St.L.	Berea, Ohio to Cleveland	11.0d 11.0s	32c	{Union {G.R.S.
B. & A.	Natick, Mass. to Framingham	4.5f	10c	G.R.S.
	Framingham, Mass. to Ashland	2.3t	6c	G.R.S.
	Ashland, Mass. to Worcester	18.6d	35c	G.R.S.
N. Y. C. & St. L.	Arcadia, Ohio to Edgerton, Ind.	68.0s	115c	Union
N. Y. N. H. & H.	Devon, Conn. to Derby Jct.	8.5d	9c	Union
	Boston, Mass. to Chickering	1.4f	18s	G.R.S.
N. Y. O. & W.	Jermyn, Pa. to Winton	3.7d	6c	Union
	Fulton, N. Y.	4.0s	11c	Union
	Sidney, N. Y. to New Berlin Jct.	2.8s	5c	Union
N. Y. R. T.	West End Line, Brooklyn	4.5d	42c	G.R.S.
N. P.	DeSmet, Mont. to Paradise	63.0s	62c	Chicago
	Tacoma, Wash. to Tenino	42.7d	59c	Chicago
P. E.	Valley Jct., Cal. to Ramona Convent	4.1d	17c	Union
	Indian Village, Cal. to Sierra Park	2.4f	32c	Union
Penn.	Wago Jct., Pa. to Enola	19.1d	25p	Union
	Wago Jct., Pa. to Parkesburg	50.6d	68p	Union
	Thorndale, Pa. to Dunlap	50.2d	55p	Union
	Rockville, Pa. to Selinsgrove Jct.	43.2d	53p	Union
	Patton, Del. to Bethel	11.0d	15p	Union
	Princeton, N. J. to Millham Jct.	8.0f	40p	Union
	Homewood Jct., Pa. to Wampum Jct.	6.3s	8p	Union
	Wampum Jct., Pa. to Lawrence Jct.	11.0d	16p	Union
	Girard Jct., Pa. to Thornton Jct.	1.7d	4s	Union
	Newman, Ohio to Bowdil	4.0s	8p	Union
	Orrville, Ohio to Burton City	1.0s	2p	Union
	Orrville, Ohio to Smithville	5.0s	10p	Union
	Smithville, Ohio	1.0t	3p	Union
	Wooster, Ohio	1.0t	3p	Union
	Loudonville, Ohio to Perrysville	4.0s	8p	Union
	Perrysville, Ohio to Lucas	2.5s	5p	Union
	Akron, Ohio to Warwick	13.7d	2s 24p	Union
	Olean, N. Y. to Portville	5.1s 2.8d	6s 8p	Union
	Buffalo, N. Y. to Jamison Rd.	12.7d	14p	Union
	Toledo Jct., Ohio to Toledo	42.0s 41.0d	103p	Union
	Ecorse Jct., Mich. to Carleton	20.0s	29p	Union
	Xenia, Ohio to Clare	37.6s 18.6d	12s 52p	Union
	Xenia, Ohio to Dayton	15.4s	21p	Union
	Dayton, Ohio to New Paris	35.0s	41p	Union
	Ben Davis, Ind. to Almeda	29.0s	43p	Union
	Almeda, Ind. to Limedale	3.0d	7p	Union
	Limedale, Ind. to Harmony	13.0s	19p	Union
	Farrington, Ill. to Casey	27.0s	34p	Union
	Hunter, Ill. to Smithboro	23.3s	26p	Union
	Columbus, O. to E. Columbus	14.0d	10p	Union
	M.P. 105, Ind. to M.P. 108.5	3.5s	3s	Union
	Louisville, Ky. to Jeffersonville, Ind.	1.4d	5p	Union
	Ben Davis, Ind. to M.P. 8.1	1.1s	1s	Union
Reading	Jenkintown, Pa. to Del. River	10.9d 0.7t 9.3d	67c	Union
St. L.-S. F.	Bristow, Okla. to Oklahoma City	80.0s	136s	Union
S. P.	Ashland, Ore. to Roseburg	43.3s	51s	Union
	Gazelle, Cal. to Montague	11.0s	13s	Union
	Roseville, Cal. to Tehama	68.7s	85c	Union
	Redwood Jct., Cal. to Centerville	5.5s	13c	Union
	Perth, Neb. to Oreana	17.8d		Union
	Promontory Point, Utah to Little Mountain	9.9d	3c	Union
	Lick, Cal. to Pomar	5.2d		Union
	Logan, Cal. to Watsonville	7.5d		Union
	Exeter, Cal. to Famosa	43.0s	106c	Union
	Bakersfield, Cal.	1.4s	1s 2c	Union
	Santa Barbara, Cal.	0.6s	3c	Union
	Colton, Cal.	0.4s	2c	Union
	Niland, Cal. to Calexico	33.5s	62s 5c	Union
	Ming, Ariz. to Picacho	94.0s	152s	Union
	Estrella, Ariz. to Picacho	60.0s	94s	Union
	Mongola, N. M. to Strauss	81.0s	142s	Union
	Temporal, N. M. to Carrizozo	35.0s	53s	Union
	Winkle, N. M. to Guadalupe	13.0s	22s	Union
T. & L.	Beeville, Tex. to Skidmore	9.4s	7s	Union
T. R. A. St. L.	East St. Louis, Ill.	0.7s	2c	G.R.S.
T. & P.	Marshall, Tex. to Shreveport, La.	26.0s	63c	G.R.S.
	Toyah, Tex. to Sierra Blanca	103.0s	155c	G.R.S.
	Livonia, La. to Alexandria	78.0s	139c	G.R.S.
U. P.	Limon, Colo. to Denver	89.0s	158c	Union
	Sharon Springs, Kan. to Limon, Colo.	121.0s	199c	Union
	Various passing track extensions		19s	Union
Wabash	Lafayette, Ind.		2s	Union
	Riverside, Ind.		2s	Union
	Edwardsville, Ill. to DeCamp	13.8d	18c	Union
	Horse Creek, Ill. to Custer Park	3.5s	2c	Union
	Willow Creek, Ind.	2.8s	2c	Union
	Peru Jct., Ind. to Lagro	15.9s	25c	Union
	Lagro, Ind. to Ft. Wayne	23.5s	44c	Union
	Lakeville, Ind. to N. Liberty	6.9s	10c	Union
	Delta, Ohio	1.6s	2s 1c	Union
	Preston, Mich.		1s	Union
W. B. & A. E.	N. A. Jct., Md. to Admiral	2.0s		Union
	Totals	3,733.0s 992.6d 18.0t 46.3f	2,178s 4,734c 384cp 807p	
		4,785.4	8,061	

Legend—
In "Miles of Road" column: s = Single track. d = Double track. t = Three tracks. f = Four tracks.
In "No. of Signals" column: s = Semaphore. c = Color-light. p = Position-light. cp = Color-position-light.
* Installed in connection with centralized control.

switches and signals being controlled from a central point. The most important of these were on the Missouri Pacific between Edgewater Jct., Kan., and Atchison, 45 miles, on the Paducah & Illinois between Pa-

ducah, Ky., and Metropolis, Ill., 15 miles; and on the Denver & Rio Grande Western between Provo, Utah, and Midvale, 31.5 miles, while the Southern Pacific has an installation practically complete between El Pinal, Cal., and Elvas, 43.5 miles. On an entire division from Grafton, W. Va., to Parkersburg, 102 miles, the Baltimore & Ohio installed power switches and signals for directing train movements by signals, the control being handled from 16 offices.

The simplified circuits and non-interlocked control machines developed for the centralized control system are well adapted for the control of remote switches and signals at outlying points, and in some cases are being used for the remote control of entire interlocking layouts. On the Burlington, where a section of 5.4 miles of single track extends between the ends of double track at Greenwood, Neb., and Waverly, power switches and signals have been installed with the control at Ashland, Neb., 6.8 miles east of Greenwood. A unique arrangement of power switches and signals for directing trains by signal indications was installed on about 10 miles of single track on the Erie, between Red House, N. Y., and WO Tower. On the Chicago & North Western, at Green Bay, Wis., the operation of junction and yard entrance switches, together with signals for directing train movement, is controlled by the dispatcher at a remote point.

Numerous other remote and centralized control installations were completed in 1929, to a total number of 121. Twenty-one of these installations utilized 244 levers of the centralized non-interlocked type of sim-

Table B—Automatic Block Signals Under Construction December 31, 1929

Road	Location	Miles of Road	Number of Signals	Manufacturer
A. T. & S. F.	Corwith, Ill. to Joliet	31.4d	34c	Union
	Hobart, Cal. to Fullerton	19.3s	41c	Union
B. & O.	Keyser, W. Va. to Grafton	78.5d	194cp	Union
	Loveland, Ohio to Midland City	20.0d	38cp	Union
B. & M.	W.Lynn, Mass. to Swampscott	5.0d	9c	Union
	Winchester, Mass. to Wilmington	7.5d	13c	Union
	Wilmington Jct., Mass. to Lowell Jct.	3.0d	6c	G.R.S.
	Fitchburg, Mass. to E. Portal	*85.0d	158c	G.R.S.
	Dover, N. H. to Rigby, Me.	*20.0s *20.0d	43c	Union
C. P.	Bedell, Ont. to Smith Falls	20.0d	26c	G.R.S.
	Bowmanville, Ont. to Agincourt	33.0s	55c	Union
	Hamilton Jct., Ont. to Main St.	1.4d	4c	G.R.S.
	Outremont, Que. to Mile End	1.0d	3c	Union
	Outremont, Que. to Breslay	1.0d	4c	G.R.S.
	St. Luc Jct., Que. to Ballantyne	2.0d	2s	Union
	Megantic, Que.	4.2s	6c	G.R.S.
	Port Arthur, Ont. to Current River	2.0d	4s	Union
	Port Moody, B. C.	3.5d	4s	Union
	North Bend, B. C. to Ruby Creek	50.0s	74s	G.R.S.
C. & O.	Huntington, W. Va. to Clyffeside, Ky.	14.0t	92c	Union
	Hilldale, W. Va. to Hinton	5.0d	10c	Union
	Old Point Jct., Va. to Oriana	10.0d	20c	Union
	Low Moor, Va. to Steele	5.0d	12c	Union
C. & N. W.	Deval, Ill. to Barrington	15.0t	73c	G.R.S.
D. L. & W.	Hoboken, N. J. to Dover	65.0d	171c	Union
E. J. & E.	Barrington, Ill.	3.8s	4c	G.R.S.
I. R. T.	Jackson Ave. to East 177th	2.3d	62c	Union
	161st to Woodlawn	4.6d	87c	Union
L. V.	Island Yard, N. J. to Drawbridge	3.3s 6.5d	8p	G.R.S.
L. & N.	Maunie, Ill. to E. St. Louis	124.9s 4.1d	272s	G.R.S.
M. P.	Osawatomie, Kan. to Ottawa	23.0s		
	Vassar, Kan. to Osage City	12.0s		
	Allen, Kan. to Council Grove	20.0s		
	Gypsum City, Kan. to Hoisington	81.0s		
	Pacific, Mo. to Boles	13.0d		
	Flinton, Ill. to Raddle	27.0s		
N. C. & St. L.	KC Jct., Tenn. to Memphis	1.7s	4c	Union
N. Y. C.	Beacon, N. Y. to Poughkeepsie	13.6f	50c	G.R.S.
	Nepperhan, N. Y. to M.P. 12	1.3s	2c	G.R.S.
	M.P. 71.3, N. Y. to Dover Furnace	1.3s	1c	G.R.S.
	Boston Corners, N. Y. to M.P. 101	2.9s	2c	G.R.S.
	Copake Falls, N. Y. to M.P. 105.6	2.1s	2c	G.R.S.
	Hillsdale, N. Y. to M.P. 110	1.7s	2c	G.R.S.
	Wellsboro Jct., Pa. to Lawrenceville	2.4s 2.2d	3c	G.R.S.
	Grand Central Terminal, N. Y. to Mott Haven	4.1f	177c	G.R.S.
C.C.C. & St.L.	Whitestown, Ind. to Colfax	22.0d	32c	Union
N.Y.C. & St.L.	Brocton, N. Y. to Thornton Jct., Pa.	50.0s	90c	Union
N. Y. O. & W.	Fish Creek, N. Y.	2.0s	4c	Union
Penn.	Northumberland, Pa. to Renovo	90.6d		
	Struthers, Ohio to Mosier	9.4d	15p	Union
Reading	Philadelphia, Pa. to Wayne Jct.	0.4n 0.2x 1.0v 3.7f 0.2d	125c	Union
	16th St., Pa. to Shawmont	5.8d	15c	Union
S. L.-S. F.	Harvard, Ark. to Turrell	4.5s 5.1d	16s	Union
S. P.	Pratt, N. M. to Mastodon	132.0s	202s	Union
	El Paso, Tex. to Temporal, N. M.	99.0s	142s	Union
	El Pinal, Cal. to Elvas	43.5s	178c	Union
U. P.	Ellis, Kan. to Sharon Springs	126.0s	212c	Union
S. J. & G. I.	Upland, Kan. to Hastings, Neb.	120.0s	187c	Union
	Totals	1,011.9s 532.1d 29.0t 21.4f 1.0v 0.2x 0.4n	2,018c 716s 232cp 23p	
		1,596.0	2,989	

Legend—
In "Miles of Road" column: s = Single track. d = Double track. t = Three tracks. f = Four tracks. v = Five tracks. x = Six tracks. n = Seven tracks.
In "No. of Signals" column: s = Semaphore. c = Color-light. p = Position-light. cp = Color-position-light.
* = Installed in connection with centralized control.

Table C—Automatic Block Signals Contemplated for 1930

Road	Location	Miles of Road	Number of Signals	Manufacturer
A. T. & S. F.	Oklahoma City, Okla. to Purcell	33.3s	56s	Union
	Chanute, Kan. to Tulsa, Okla.	29.6s	220s	Union
	Holliday, Kan. to Olathe	12.5d	30c	Union
	Kinsley, Kan. to Dodge City	28.0s 7.8d	....	.....
	La Junta, Colo. to Pueblo	62.9s	....	.....
	Hutchinson, Kan. to Kinsley	84.4s	....	.....
	Southland, Tex. to Post	16.5s	....	.....
	Pyron, Tex. to Sweetwater Jct.	17.1s	....	.....
	San Angelo, Tex. to Del Rio Jct.	4.6s	....	.....
	Hutchinson, Kan. to Kinsley	98.7s	....	.....
	Lubbock Jct., Tex. to Lubbock	3.1s	....	.....
	Brownwood, Tex. to Gravity	5.1s	....	.....
	Galveston, Tex. to Alvin	25.8s	....	.....
	Alvin, Tex. to Houston	24.0s	....	.....
	Carrizo, Ariz. to Winslow	47.5d	50c	Union
	Barstow, Cal. to Mojave	71.8s	118c	Union
	DelMar, Cal. to San Diego	23.3s	54c	Union
	Fullerton, Cal. to Santa Ana	10.6s	17c	Union
B. & O.	N. Lima, Ohio to Penna. Jct.	66.2s 10.5d	106cp	.....
	Shattuc, Ill. to E. St. Louis	53.4s 4.0d	104cp	.....
	Pittsburgh, Pa. to Wheeling, W. Va.	42.1s 19.0d	116cp	.....
	Parkersburg, W. Va. to Chillicothe, Ohio	88.0s 8.5d	176cp	.....
	Chillicothe, Ohio to Midland City	53.0s	102cp	.....
	Seymour, Ind. to Washington	82.4s	194cp	.....
	Washington, Ind. to Shattuc	108.7s	232cp	.....
	N. Vernon, Ind. to Watson	46.8s	90cp	.....
	Watson, Ind. to Jeffersonville	6.7s	11cp	.....
C. & O.	Richmond, Va. to Westham	7.0d	6c	Union
	Montgomery, W. Va. to Kanawha Falls	10.0d	22c	Union
	Milton, W. Va. to Blue Sulphur	8.0d	22c	Union
	Augusta, Ky. to Stevens	32.0d	61c	Union
C. C. C. & St. L.	Mounds, Ind. to Muncie	17.0d	26c	Union
C. M. St. P. & P.	Janesville, Wis. to Milton Jct.	9.0s	15c	.....
Erie	Griffith, Ind. to Hammond	8.0d	7s 22c	.....
H. V.	Columbus, Ohio to Cummings	115.0d	160c	.....
I. R. T.	E. 219th St. to Nereid Ave., N. Y.	1.1d	30c	Union
L. & N.	Harriman, Tenn. to Gauntlet	0.3s	4s	.....

Road	Location	Miles of Road	Number of Signals	Manufacturer
M.-K.-T.	Yust, Okla.	4.0s	8c	Union
	La Grange, Tex. to Cat Spgs.	37.0s	40c	Union
	Centerville, Kan. to Parsons..	59.0s	70c	Union
	Eureka, Tex. to Houston....	5.3s	12c	Union
	Stringtown, Okla. to Atoka..	5.0d	3c	Union
	Sparks, Tex. to Temple.....	11.2s	19c	Union
	San Antonio, Tex.	4.0s	6c	Union
	Greenville, Tex.	0.5s	4c	Union
M. P.	Ottawa, Kan. to Vassar.....	16.0s	....	.....
	Osage City, Kan. to Allen....	17.0s	....	.....
	Hoisington, Kan. to McCracken	47.0s	....	.....
	Sugar City, Colo. to Pueblo..	55.0s	....	.....
	Collinston, La. to Monroe....	24.0s	....	.....
	Riverton, La. to Urania.....	28.0s	....	.....
	Cole Jct., Mo. to Boonville..	42.0s	....	.....
	Miscellaneous Sections	37.0s	....	.....
N. Y. C.	125th St., N. Y. to Spuyten Duyvil	4.5d	16c	G.R.S.
N. Y. C. & St. L.	Wingate, Ind. to Humrick, Ill.	34.0s	60c	. ...
	Charleston, Ill. to Madison..	128.0s	200c	.....
N. Y. N. H. & H.	Cedar Hill, Conn. to New London	39.0d	70c	.....
	Brockton, Mass. to Campello.	3.0d	6c	.....
P. E.	No. Hollywood, Cal. to Van Nuys	7.0s	17c	.....
	Los Angeles, Cal. to Watts..	6.5f	78c	.....
	Hermosillo, Cal. to Torrence..	3.2s	12c	.....
Reading	Wayne Jct., Pa. to Jenkintown	0.4f 0.1t 5.0d	35c	.....
St. L.-S. F.	So. E. Jct., Mo. to Cape Girardeau	125.5s	194s	Union
	Sapulpa, Okla. to Bryant....	51.0s	80s	Union
	Memphis, Tenn. to Hickory Flat, Miss.	64.0s	104s	Union
T. & P.	Hodge, Tex. to Whitesboro..	67.0s	112c	G.R.S.
	Shreveport Jct., La. to X-Yard	2.6s	24c	G.R.S.
U. P.	Upland, Kan. to Menoken....	70.0s	108c	Union
O. S. L.	Idaho Falls, Id. to Ashton..	51.3s	102c	Union
	Melrose, Mont. to Divide....	6.5s	12s	Union
	Various Passing Track Extens.	.....	18s	Union
Wabash	New Haven, Ind. to Artic....	30.8s	53c	Union
	Artic, Ind. to Montpelier, O.	11.9s	18c	Union
	Brunswick, Mo.	6.3s	8c	Union
	Boody, Ill. to Taylorville....	18.2s	22c	Union
	Totals	2,159.7s 364.4d 0.1t 6.9f	1,736c 695s 1,131cp	
		2,531.1	3,562	

Legend—

In "Miles of Road" column: s = Single track. d = Double track. t = Three tracks. f = Four tracks. v = Five tracks. x = Six tracks. n = Seven tracks.

In "No. of Signals" column: s = Semaphore. c = Color-light. p = Position-light. cp = Color-position.

* = Installed in connection with centralized control system.

plified control and circuits, while on 100 installations levers in interlocking machines or of the desk type were used. Over 1,150 controlled signals and 308 power-operated switches were included in these installations, equivalent to 61 per cent of the number of switches so equipped in new regular interlocking during the year.

Car Retarder Installations Increase

Car retarders were installed at 12 yards during 1929, totaling 221 retarders and 12,228 rail feet of retarder as compared with four yards, 53 retarders and 3,734 rail feet completed during the previous year. The largest installation completed in 1929, in terms of rail feet retarder, was on the Pennsylvania at Pitcairn, Pa., although the plant installed by the New York Central at DeWitt, N. Y., involved seven more retarders.

The Teletype system is being used in many of these yards as a means of transmitting the switching lists to the various towers simultaneously. Improvements are being made constantly in the retarders and control apparatus, and more accurate information is available concerning the type of yard layout and grades best adapted for retarder operation.

Highway Crossing Protection Increases

During 1929 the railroads continued an active program to provide automatic highway crossing signals, a total of 2,501 being installed as compared with 2,254 in 1928. Of the 2,501 signals completed in 1929, 522 were the wig-wag type and 1,979 the flashing light type. The greater portion of the flashing light type which were installed on the Wabash and the Grand Trunk Western included also an illuminated stop sign, while those installed in Minnesota included a revolving disk sign. In Canada, the Michigan Central installed 40 of the

Table D—Interlocking Plants Completed During 1929

Road	Location	Manufacturer	Working Levers: Mechanical	Electrical	Electro-Pneumatic	Elec. Mech.: Mech.	Elec. Mech.: Elec.
A. T. & S. F.	Emporia, Kans.	G.R.S.	..	52	..	..	..
	Harper, Kan.	Union	..	14	..	..	..
	Waynoka, Okla.	Union	..	22	..	..	..
	Texico, N. M.	Union	..	8	..	..	..
	Wharton, Tex.		10	..	..	..	..
	Barstow, Cal.	G.R.S.	..	27	..	..	..
B. & O.	"RS" Rosemont, W. Va.		..	8	..	..	..
	Bridgeport, W. Va.		..	12	..	..	..
	Wilsonburg, W. Va.		..	12	..	..	..
	Wolf Summit, W. Va.		..	12	..	..	..
	Salem, W. Va.		..	12	..	..	..
	Long Run, W. Va.		..	8	..	..	..
	Smithburg, W. Va.		..	12	..	..	..
	Duckworth, W. Va.		..	12	..	..	..
	Pennsboro, W. Va.		..	8	..	..	..
	Ellenboro, W. Va.		..	12	..	..	..
	Jackson, W. Va.		..	12	..	..	..
	Cornwallis, W. Va.		..	12	..	..	..
	Petroleum, W. Va.		..	8	..	..	..
	Walker, W. Va.		..	12	..	..	..
	"SY" Parkersburg, W. Va.		..	7	..	..	..
	Silver Run, W. Va.		..	12	..	..	..
	Boyd, Md.		..	..	..	16	16
B. & M.	Hoosac Tunnel, Mass. East Portal	Union	..	..	..	..	3
	Hoosac Tunnel, Mass. West Portal	Union	..	..	..	..	5
B. R. & P.	Machias, N. Y.	Union	..	12	..	..	..
C. N.	Port Colborne, Ont.	Union	16	..	..	..	..
	Welland, Ont.	Union	12	..	..	..	..
	Niagara Falls, Ont.	Union	32	..	..	..	..
G. T. W.	Vicksburg, Mich.	Union	..	4	..	..	..
C. P.	Brandon, Man.		16	..	..	..	..
C. & O.	"KC" Junction, Ky.	Union	..	..	50	..	..
	Covington, Ky.	Union	..	..	18	..	..
	Limeville, Ky.	Union	..	..	..	10	8
C. B. & Q.	Lincoln, Neb.	G.R.S.	..	79	..	..	..
C. R. I. & P.	Blue Island, Ill.	Chicago	..	42	..	..	..
D. L. & W.	Hoboken, N. J.		..	..	71	..	..
D. T. & I.	Petersburg, Mich.	Union	..	2	..	..	..
Erie	Falconer, N. Y.	Union	..	..	..	23	4
	Salamanca, N. Y.	Union	..	..	..	10	2
H. V.	Cummings, Ohio	Union	..	8	..	..	..
L. & N.	Bayou Sara, Ala.	Union	..	..	..	4	2
M. P.	Belt Jct., Mo.		2	..	..	3	..
	Broadway, Kansas City, Mo.	G.R.S.	..	24	..	..	..
	Gypsum City, Kan.		2	..	..	..	..
	Hoxie, Ark.	G.R.S.	..	37	..	..	..
	Van Buren, Ark.	R.R.S.	19	..	..	..	..
	Sallisaw, Okla.	R.R.S.	20	..	..	..	..
	Lane, Kan.		2	..	..	..	..
	Dearing, Kan.		2	..	..	..	..
I. G. N.	Pierce Jct., Tex.	G.R.S.	8	..	..	..	..
S. A. U. & G.	Mathis, Tex.	R.R.S.	18	..	..	..	..
G. C. L.	Mauriceville, Tex.	G.R.S.	8	..	..	..	..
	Grayburg, Tex.	R.R.S.	10	..	..	..	..
	Angleton, Tex.	R.R.S.	8	..	..	..	..
	Allenhurst, Tex.	R.R.S.	10	..	..	..	..
	Blessing, Tex.	R.R.S.	10	..	..	..	..
	Placedo, Tex.	R.R.S.	10	..	..	..	..
	Gulf Coast, Tex.	R.R.S.	6	..	..	..	..
	Fullerton, Tex.	R.R.S.	3	..	..	..	..
N. Y. C. East	Garrison, N. Y.	G.R.S.	..	..	..	10	17
	W. Bergen, N. Y.	G.R.S.	..	..	..	22	20
West	Collinwood, Ohio	G.R.S.	..	151	..	..	..
	Berea, Ohio	G.R.S.	..	105	..	..	..
	Pt. Clinton, Ohio	G.R.S.	..	30	..	..	..
C.C.C. & St.L.	Union City, Ind.	Union	..	35	..	..	..
	Gano, Ohio	Union	..	9	..	..	..
P. & L. E.	Pittsburgh, Pa.	Union	..	55	..	..	..
N.Y.C. & St.L.	Claypool, Ind.	Union	..	9	..	..	..
	Cleveland, Ohio	G.R.S.	..	28	..	..	..
	Bunker Hill, Ind.		..	..	..	12	7
N. Y. N. H. & H.	Harlem River, N. Y.		20	..	..	..	..
N. Y. R. T.	Tower B—Coney Island	G.R.S.	..	58	..	..	..
	Tower B—Coney Island	G.R.S.	..	75	..	..	..
	Tower D—Coney Island	G.R.S.	..	47	..	..	..
N. P.	Tacoma, Wash.	G.R.S.	31	..	..	..	..
Penna.	Harrisburg, Pa.	Union	..	..	97	..	..
	Lancaster, Pa.	Union	..	..	46	..	..
	Tyrone, Pa.	Union	..	..	..	3	15
	Law Jct., Pa.	Union	..	..	..	40	10
	Rockville, Ohio	Union	..	..	..	14	15
	Union City, Ind.	Union	..	37	..	..	..

Road	Location	Manufacturer	Working Levers: Mechanical	Electrical	Electro-Pneumatic	Elec. Mech.: Mech.	Elec. Mech.: Elec.
	Bunker Hill, Ind.	Union	14	..	..	..	..
	Vicksburg, Mich.	Union	..	4	..	..	..
P. M.	Clark Ave., Detroit, Mich.	Union	..	10	..	..	..
	Fort St., Detroit, Mich.	Union	..	9	..	..	..
	Saginaw, Mich.		3	..	..	..	..
	Baldwin, Mich.	Union	..	2	..	..	..
Reading	Pottsville, Pa.	Union	..	..	..	9	9
St. L.-S. F.	Nettleton, Ark.	Union	18	..	..	..	..
	Liberal, Mo.	Union	24	..	..	..	..
S. A. L.	Denmark, S. C.	Union	..	..	..	7	9
	Marion, S. C.	Union	6	..	..	..	..
S. P. T. & L.	Tatsie, Tex.	Union	10	..	..	..	..
	Edcouch, Tex.	Union	8	..	..	..	..
	Lantana, Tex.	Union	8	..	..	..	..
	Rosita, Tex.	Union	8	..	..	..	..
	Englewood, Tex.	G.R.S.	..	15	..	..	..
	Waco, Tex.	G.R.S.	..	11	..	..	..
	Eureka, Tex.	G.R.S.	..	6	..	..	..
T. & P.	Eastland, Tex.	G.R.S.	..	..	..	6	2
	Melville, La.	G.R.S.	..	9	..	..	..
Totals	New: Plants 99						
	New: Levers 2,170		348	1,207	282	189	144
	Rebuilt, not listed in table: Plants 68						
	Rebuilt, not listed in table: Levers 403		72	97	111	49	74
	Grand Total—Levers 2,573		420	1,304	393	238	218

neon tube lightning flash type of crossing signals. Twenty electrically-operated crossing gates controlled automatically by track circuits were installed at nine crossings in the United States during the past year.

Construction Underway

At the close of 1929, construction was underway on 58 different signal installations on 21 roads, involving 1,596 miles of road and 2,989 signals. These installations are scattered from Canada to Texas, indicating that construction programs are being pushed through to completion without regard to winter weather.

Interlocking construction is under way on 27 new plants, involving 1,136 levers, while 39 plants are being rebuilt, involving 311 additional levers. Remote control layouts and centralized-control installations are underway at 33 points. Car retarders are being installed in a yard at Detroit, Mich., on the Michigan Central and at Potomac Yard, Va., on the Richmond, Fredericksburg & Potomac.

Table E—Interlocking Plants Under Construction December 31, 1929

Road	Location	Manufacturer	Working Levers: Mechanical	Electrical	Electro-Pneumatic	Elec. Mech.: Mech.	Elec. Mech.: Elec.
B. & O.	4 New Plants		..	..	..	..	..
B. & M.	Mill St., Salem, Mass.		..	..	23	..	..
	Waltham, Mass.	Union	..	..	17	..	..
C. & O.	Huntington, W. Va.	Union	..	..	36	..	..
City of Philadelphia	Walnut St. Subway, Philadelphia, Pa.	Union	..	..	43	..	..
I. R. T.	University Sta., N. Y.	Union	..	..	8	..	..
L. V.	Oak Island Jct., N.J.	G.R.S.	..	42	..	..	..
L. & N.	3 Mile Cr., Ala.		..	..	..	5	7
M. P.	Verdon, Neb.		12	..	..	..	..
	Auburn, Neb.		2	..	..	..	..
G. C. I.	Krotz Springs, La.	G.R.S.	..	9	..	..	..
	Bay City, Tex.		..	12	..	..	..
N. Y. C.	New Hamburg, N. Y.	G.R.S.	..	67	..	..	..
	106th St., New York	G.R.S.	..	44	..	..	..
	Harlem River, N. Y.	G.R.S.	..	29	..	..	..
	Mott Haven Jct., N. Y.	G.R.S.	..	200	..	..	..
	South Bend, Ind.	G.R.S.	..	265	..	..	..
M. C.	Detroit, Mich.	G.R.S.	..	79	..	..	..
C.C.C. & St.L.	Linndale, Ohio	G.R.S.	..	x	..	..	..
	65th St., Cleveland, Ohio	G.R.S.	..	x	..	..	..
N.Y.C. & St.L.	Altamont, Ind.	Union	..	23	..	..	..
	Templeton, Ind.	Union	..	19	..	..	..
	Red Key, Ind.	Union	..	..	..	10	4
Penna.	Greenville, N. J.	Union	..	..	47	..	..
L. I.	"JE" Jamaica, N. Y.	Union	..	83	..	..	..
St. L.-S. F.	Cape Girardeau, Mo.	Union	12	..	..	..	..
S. P. T. & L.	Georgiana Slough, Cal.	Union	2	..	..	..	..
	Chacahoula, La.	Union	3	..	..	..	..
	Lake Charles, La.	Union	2	..	..	..	..
U. P.	Omaha "C," Neb.	Union	..	31	..	..	..
Totals	New: Plants 33						
	New: Levers 1,136		33	903	174	15	11
	Rebuilt, not listed in table: Plants 43						
	Rebuilt, not listed in table: Levers 316		..	150	105	31	30
	Grand Total—Levers 1,452		33	1,053	279	46	41

Table F—Interlocking Plants Contemplated for 1930

Road	Location	Manufacturer	Working Levers: Mechanical	Electrical	Electro-Pneumatic	Elec. Mech.: Mech.	Elec. Mech.: Elec.
A. T. & S. F.	Augusta, Kan.	G.R.S.	..	52	..	..	..
	Kinsley, Kan.		..	12	..	..	..
	Gainesville, Tex.		..	x	..	..	..
	Brownwood, Tex.		..	x	..	..	..
	Conroe, Tex.		x	..	..	..	..
	Cleveland, Tex.		x	..	..	..	..
	Sealy, Tex.		..	x	..	..	..
B. & O.	35 New Plants		..	..	..	..	..
C. & E. I.	Danville, Ill.		..	4	..	..	..
	Danville, Ill.		..	4	..	..	..
	Vincennes, Ind.		..	6	..	..	..
	Princeton, Ind.		..	2	..	..	..
	Evansville, Ind.		..	4	..	..	..
C. G. W.	W. Waterloo, Ia.		..	4	..	..	..
	E. Waterloo, Ia.		..	4	..	..	..
Erie	Lackawaxen, Pa.		..	..	..	13	7
	Hornell, N. Y.		..	..	..	6	4
	Corry, Pa.		..	..	..	12	8
G. N.	Moorhead, Minn.	G.R.S.	..	59	..	..	..
H. V.	Carey, Ohio		..	20	..	..	..
	Fostoria, Ohio		..	68	..	..	..
	Armitage, Ohio		..	..	..	10	5
K & I. T.	New Albany, Ind.	G.R.S.	..	..	..	..	..
L. & N.	13th St., Birmingham, Ala.		..	60	..	..	..
M.-K.-T.	Ft. Scott, Kan.	Union	3	..	..	..	..
	Sealy, Tex.	Union	..	10	..	..	..
N. Y. C.	W. 152nd St., N. Y.	G.R.S.	..	66	..	..	..
	W. 181st St., N. Y.	G.R.S.	..	32	..	..	..
	Black Rock, N. Y.	G.R.S.	..	38	..	..	..
	Fostoria, Ohio	G.R.S.	..	68	..	..	..
	Armitage, Ohio	Union	..	..	..	16	16
C.C.C. & St.L.	Dale, Ind.	Union	..	12	..	..	..
	Hazelrigg, Ind.	Union	..	12	..	..	..
N.Y.C. & St.L.	Alexandria, Ill.		..	..	..	10	6
	Peru, Ind.		..	..	..	4	8
	Metcalf, Ill.		..	..	..	4	2
N. & W.	Bannon, Ohio		..	..	28	..	..
	Columbus, Ohio		..	..	15	..	..
Sac. Nor.	Vanden, Cal.	Union	..	..	..	2	..
S. P.	Martinez, Cal.	G.R.S.	..	48	..	..	..
	Newark, Cal.	G.R.S.	..	20	..	..	..
	Dayton Ave., Los Angeles, Cal.	G.R.S.	..	32	..	..	..
T. & P.	Cisco, Tex.	G.R.S.	..	19	..	..	..
U. P.	Topeka, Kan.		..	58	..	..	..
	Manhattan, Kan.		..	37	..	..	..
	Kansas City, Kan.		..	23	..	..	..
	Cheyenne, Wyo.		..	33	..	..	..
L. A. & S. L.	Wilmington, Cal.	G.R.S.	..	24	..	..	..
	N. Long Beach, Cal.	G.R.S.	..	12	..	..	..
Totals	New: Plants 48						
	New: Levers 1,022		3	843	43	77	56
	Rebuilt, not listed in table: Plants 58						
	Rebuilt, not listed in table: Levers 384		..	242	..	114	28
	Grand Total—Levers 1,406		3	1,085	43	191	84

Good Prospects for 1930

Twenty roads have already decided on signaling programs for 1930, the report of work contemplated including automatic signals on 2,531 miles of road, involving 3,562 signals, this total being about 10 per cent in excess of that contemplated at this time last year.

Over 48 new interlocking plants, involving 1,012 levers, are definitely planned for 1930. Also, over 53 remote control and centralized-control installations involving 269 levers, 277 switches and 484 controlled signals are planned for this year.

Many roads have not yet completed their budgets for 1930, and other roads authorize installations individ-

Table G—Remote and Centralized-Control Installations Completed During 1929

Road	Location	Manufacturer	Number of Levers: Desk Type	Number of Levers: Centralized Type	Power Operated Switches	Number of Signals Controlled
A. T. & S. F.	Olathe, Kan.	Union	4	..	2	8
	Gardner, Kan.	Union	2	..	1	3
	Hutchinson, Kan.	Union	6	..	4	6
	Pueblo, Colo.	Union	8	..	6	12
	Curtis, Okla.	Union	4	..	2	6
	Woodward, Okla.	Union	2	..	1	3
	Pampa, Tex.	Union	..	..	1	..
	Melrose, N. M.	Union	4	..	2	6
	Taiban, N. M.	Union	4	..	2	6
	Yeso, N. M.	Union	4	..	2	6
	Pedernal, N. M.	Union	4	..	2	6
	Temple, Tex.	Union	2	..	1	4
	Somerville, Tex.	Union	6	..	3	9
B. & G.	Magna, Utah		..	20	2	31
B. & M.	North Chelmsford Mass.	G.R.S.	..	12	6	14
	White River Jct., Vt.	Union	2	..	1	3
	Hoosick Jct., N. Y. to Eagle Bridge	Union	..	15	10	14
	Sprague's Sw., Mass.	Union	4	..	..	7
	No. Adams, Mass.	Union	2	..	..	2
	Lowell, Mass.	Union	1	..	..	1
C. N.	Toronto, Ont.	Union	14	..	9	22
C. P.	Belleville, Ont.	G.R.S.	3	..	..	4
	London, Quebec St., Ont.	Union	3	..	2	8
	Mando, Que.	Union	2	..	1	7
	Farnham, Que.	Union	11	..	6	21
C. of Ga.	Mogul, Ga.		..	..	2	..
C. & N. W.	Green Bay, Wis.	G.R.S.	..	6	4	17
	Norfolk, Neb.	G.R.S.	3	..	1	5
	Chadron, Neb.	G.R.S.	2	..	1	12
C. B. & Q.	Mendota, Ill.	G.R.S.	2	..	1	4
	Zearing, Ill.	G.R.S.	4	..	..	10
	Princeton, Ill.	G.R.S.	4	..	..	10
	Wyanet, Ill.	G.R.S.	4	..	..	10
	Buda, Ill.	G.R.S.	8	..	2	18
	Neponset, Ill.	G.R.S	4	..	..	10
	Kewanee, Ill.	G.R.S.	4	..	..	12
	Oneida, Ill.	G.R.S.	4	..	..	12
	Herrington, Wis.	G.R.S.	..	8	6	13
	Halpin, Iowa	G.R.S.	..	9	6	18
	Red Oak, Iowa to Balfour	Union	..	37	20	88
	Greenwood, Neb. to Waverly	Union	..	..	5	25
	Chillicothe, Mo.		..	..	4	8
	St. Joseph, Mo.	G.R.S.	5	..	..	10
	Flag Center, Ill.	G.R.S.	..	16	14	37
C. M. St. P. & P.	Lanark, Ill.		4	..	3	9
	Brookfield, Wis.	Union	2	..	1	4
	Franklin Park, Ill.	Union	5	..	4	9
	Hastings, Minn.	Union	2	..	1	5
	Rondout, Ill.	Union	2	..	1	4
C. R. I. & P.	Gresham, Ill.	G.R.S.	..	..	1	3
D. & R. G. W.	Lehi, Utah	G.R.S.	.	14	12	56
Erie	West Hawley, Pa.		..	..	1	3
	Niobe, N. Y.		..	..	1	3
	Columbus, Ohio		..	..	1	3
	Oakley, N. Y.		..	..	1	3
	Atlantic, Pa.		..	..	1	3
	Amasa, Pa.		..	..	2	3
	Susquehanna, Pa.		..	..	1	3
	Cuba Jct., N. Y.		..	..	1	3
	Callicoon, N. Y.		..	..	2	3
	Rosas, Pa.		..	..	2	3
	Red House, N. Y.		..	..	1	3
G. & F.	Hamburg, S. C.	Union	..	1	1	4
G. N.	Brook Park, Minn.	G.R.S.	6	..	3	12
	Hinckley, Minn.	G.R.S.	2	..	1	5
	Gunn, Minn.	G.R.S.	2	..	1	4
	Stanley, N. D.	G.R.S.	4	..	2	8
I. C.	Kenney, Ill.	G.R.S.	..	4	1	10
L. V.	Greens Bridge, N. J.	G.R.S.	..	4	1	4
	Braders, Pa.	G.R.S.	..	8	2	5
	South Easton, Pa.	G.R.S.	..	4	1	3
	Flagtown, N. J.	G.R.S.	..	8	2	7
	Conway, Pa.	G.R.S.	..	12	3	8
M. St. P. & S. S. M.	Superior, Wis.		1	..	1	..
M.-K.-T.	Pottsboro, Tex.	Union	2	..	1	4
M. P.	Atchison, Kan. to Edgewater	G.R.S.	..	45	27	102
	Forrest City, Ark.		1	..	..	8
I. G. N.	Spring, Tex.	G.R.S.	1	..	1	4
G. C. L.	Kinder, La.	G.R.S.	1	..	1	4
	Gulf Coast, Tex.	G.R.S.	1	..	1	4
N. Y. C.						
East	Utica, N. Y.	G.R.S.	6	..	4	6
I. H. B.	Blue Island Yard, Ill.		2	..	2	3
M. C.	Michigan City, Ind.	G.R.S.	1	6*	2	12
P. & E.	Danville, Ill.		..	1	..	4
C.C.C. & St.L.	Vernon, Ohio	Union	1	..	1	4
	Galion Yard, Ohio	Union	1	..	1	4
B. & A.	Chatham, N. Y.		6	..	2	6
	Webster Jct., Mass.		6	..	2	6
	Natick, Mass.		3	..	..	3
N.Y.C. & St.L.	Conneaut, Ohio		2	..	1	4
	Shinrock, Ohio		2	..	1	4
	Townwood, Ohio		2	..	1	4
	Continental, Ohio		4	..	2	8
	Broughton, Ohio		2	..	1	4
	Ashtabula, Ohio		2	..	1	4
N. & W.	Vicker, Va.		3	..	1	6
Penna.	Frenchtown, N. J.	Union	4	.	2	6
	McElhatton, Pa.	Union	7	..	2	7
	Canton, Pa.	Union	6	..	1	5
	Birdsboro, Pa.	Union	17	..	5	25
	Midway, Pa.	Union	3	..	1	3
	Burnbank, Del.	Union	10	..	3	11
	Delmar, Del.	Union	4	..	2	5
	Herndon, Pa.	Union	4	..	2	6
	Cross Cut, Pa.	Union	..	4	2	6
	Detour, Ohio	Union	..	7	4	8
	Akron, Ohio	Union	3	..	..	5
	Barberton, Ohio	Union	5	..	4	6
	Machias, N. Y.	Union	11	..	4	12
	Whitehouse, N. Y.	Union	7	..	2	6
	Mifflin, Ohio	Union	4	..	2	6
	Morrison, Ind.	Union	4	..	2	6
	Arcola, Ind.	Union	2	..	1	3
	Union City, Ind.	Union	1	..	1	..
	Xenia, Ohio "WY"	Union	..	..	2	4
	Xenia, Ohio "GW"	Union	7	..	6	6
	Dayton, Ohio	Union	3	..	1	4
	Jeffersonville, Ind.	Union	..	..	3	4
P. M.	Holland, Mich.	G.R.S.	1	..	1	4
	Grandville, Mich.	Union	1	..	1	4
S. P.	Carlin, Nev.	Union	2	..	1	1
	Niles, Cal.	Union	2	..	2	6
T. & L.	Beeville, Tex.	Union	..	9	4	25
	Bonita Jct., Tex.	Union	2	..	1	6
	El Paso, Tex.	Union	2	..	1	5
	Sierra Blanca, Tex.	Union	4	..	2	14
U. P.	Kelso, Cal.	Union	2	..	1	4
	Cima, Cal.	Union	2	..	1	4
	Moapa, Nev.	Union	2	..	1	4
Totals			343 levers 101 plants	244 levers 21 plants	309	1,150

* Push buttons.

ually as the need arises throughout the year. All evidence, therefore, indicates that construction for 1930 will equal, if not exceed, that of 1929.

Train Control Quiet

During 1929 there was very little activity in the field of automatic train control, the installations required on

(*Continued on page 118*)

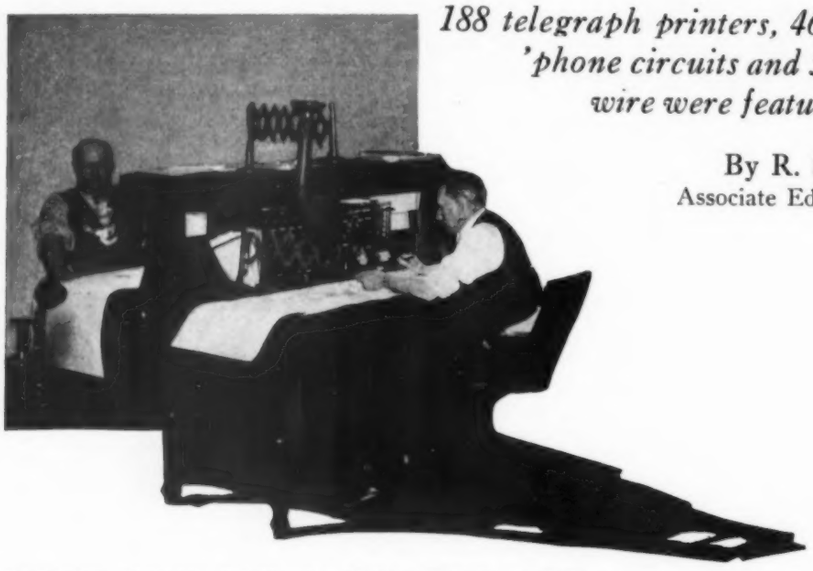
Table H—Car Retarder Installations Completed During 1929

Road	Location	No. of Classification Tracks	No. of Towers	No. of Retarders	Rail Ft. Retarders	No. of Power Switches	No. of Switch Signals	No. of Power Skates	Manufacturer
B. & M.	Mystic Jct., Mass.	18	1	8	616	16	16	..	Union
Carnegie Steel Company	Carrie Furnace Rankin, Pa.	1	1	1	77	..	..	..	Union
C. & O.	Russell, Ky.	21	3	21	1,324	25	25	21	Union
C. & N. W.	Proviso, Ill.	52	3	27	1,040	51	51	..	G.R.S.
C. C. C. & St. L.	Sharonville, Ohio	30	2	24	1,613	29	29	..	Union
M. C.	West Detroit, Mich.	31	2	17	561	35	35	31	G.R.S.
N. Y. C.	DeWitt Eastward, N. Y.	40	3	32	1,232	40	40	40	G.R.S.
	Toledo Dock, Ohio	7	1	3	116	6	6	1	G.R.S.
N. Y. N. H. & H.	Providence, R. I.	34	2	19	732	34	34	34	G.R.S.
	Cedar Hill, Eastbound, Conn.	45	3	23	1,639	48	48	..	Union
	Cedar Hill, Westbound, Conn.	38	3	21	1,500	40	40	..	Union
Penna.	Pitcairn, Pa.	34	3	25	1,778	33	33	34	Union
		351	27	221	12,228	357	357	161	

1929 Witnessed Marked
Increase in Communication Plants

188 telegraph printers, 46,489 miles of long-distance 'phone circuits and 54,890 miles of copper wire were features of year's work

By R. S. Kenrick
Associate Editor, *Railway Age*



The Telephone Dispatching Switchboard Is the "Nerve" Center of a Railroad

A SUBSTANTIAL increase was made in the capacity of the telegraph and telephone plants of the steam railroads during 1929. This increase not only improved railway communication service, but it also, in many cases, effected economies. This is particularly true of the installations of telegraph printers which last year numbered 188, larger than in any previous year. Not only is the printer replacing Morse operators on long-distance circuits, but it is also supplanting messenger service at large freight yards, particularly where car retarders are employed at hump yards.

The last year also witnessed an exceptionally large increase in the mileage of long-distance telephone lines, 46,489 as compared with 6,552 the year previous. More than half of this huge increase, however, is the result of a 25,000-mile extension of long-distance telephone circuits on the Canadian National, which handles an extensive commercial as well as railroad business. There was also a decided increase in the mileage of telegraph circuits, 169,461 as compared with 136,184 in 1928. More than three-fourths of this amount, however, is accounted for by an extension of 131,195 miles of telegraph circuits on the Canadian National. Again, this huge increase in capacity was largely for handling commercial telegraph business and represents principally extensive carrier-current telegraph installations.

Table A—Principal Increases in Plant Facilities During 1929 as Compared with 1928 Increases

		1929	1928
New or rebuilt pole lines:			
Railroad owned	3,462		
Commercial	3,971		
Jointly owned	4,086		
Total		11,519	8,897
Copper wire installed:			
Railroad owned	27,498		
Commercial	27,392		
Total		54,890	35,084
Road mileage dispatched by telephone		4,424	3,723
Long-distance telephone lines		46,489	6,552
Telegraph circuits (all types)		169,461	136,184
Printing telegraph circuit mileage		8,425	7,125
Printing telegraph machines		188	59

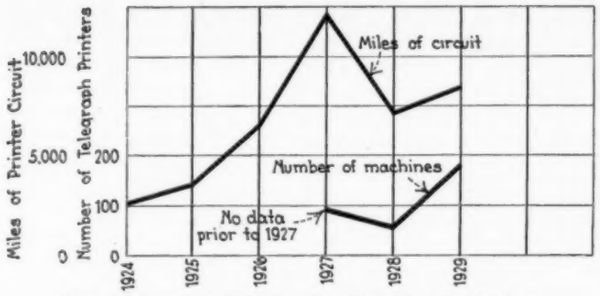
The copper wire installed in 1929, 54,890 miles, greatly exceeded the 35,084 miles of wire installed in 1928. This figure even exceeds the record figure of 53,932 miles of copper wire installed in 1927. It is also significant that half of this wire was purchased by the railroad telegraph departments for railroad circuits and that the other half was purchased by commercial telegraph companies for railway circuits. The telephone continues to displace the telegraph for train dispatching purposes, 4,424 miles of road being added in 1929 to the mileage of road dispatched by telephone. The activity in this particular direction exceeded that in 1928 by 20 per cent.

Table B—Principal Copper Wire Installations During 1929

	Miles		
Road	Railroad Owned	Commercial	Total
C. N.	4,145	7,939	12,084
S. P. (System)	2,255	3,830	6,085
C. P.	2,395	2,169	4,564
A. T. & S. F.	1,777	2,693	4,470
M. P.	2,814	538	3,352
U. P. (System)	1,167	1,545	2,712
Penna.	1,797	540	2,337
C. & O.	1,525	444	1,969
N. Y. N. H. & H.	1,766	....	1,766
C. R. I. & P.	979	507	1,486
B. & M.	1,043	209	1,252
St. L.-S. F.	356	829	1,185
Wab.	....	1,052	1,052
G. N.	1,036	....	1,036
N. Y. C. (System)	229	771	1,000

1929 Progress

The steady increase in carrier-current telegraph circuits on the two large Canadian railroads, which has been noticeable since 1927, is explained by the heavy traffic and the geographical conditions encountered on these systems. The use of carrier telegraph is based solely upon considerations of economy, and, where great transmission distances are involved, the carrier system



The Telegraph Printer Is Steadily Replacing the Morse Operator

has proved to be less expensive than the common telegraph system. The service on carrier channels has been found to be just as good, if not better, than by the use of straight metallic circuits. Nor is this all. A long-distance telephone circuit can be provided over the same pair of wires.

Of outstanding technical importance was the satisfactory train telephone test on the Canadian National in May of last year. It was demonstrated that continuous communication could be maintained between a train and the Canadian National offices in Toronto, Ont. As a result of this successful test, it is reported that plans have been made for installing regular train telephone service between Toronto, Ont., and Montreal, Que., on the main line. This demonstration was described in an article in the *Railway Age* of May 11, 1929, page 1100.

Experimentation with radio for front to rear-end communication on long freight trains received a setback last year, when the Federal Radio Commission ordered the New York Central to discontinue its radio operations on freight trains running between Albany, N. Y., and Syracuse. Until the railroads interested make specific requests of the Federal Radio Commission for authority to use definite frequency bands for railway communication service, no further progress

Table C—Telegraph Printer Installations in 1929

Road	Miles of Circuit	Number of Machines
C. P.	2,847	45
N. Y. C. (System)	397	43
S. P. (System)	1,153	25
N. Y. N. H. & H.	12	16
A. T. & S. F.	350	15
Penna.	767	14
M. P.	333	10
C. R. I. & P.	1,256	4
C. & N. W.	20	4
C. M. St. P. & P.	421	4
S. A. L.	652	4
N. P.	39	2
St. L.-S. F.	178	2
Total	8,425	188

can be made. Radio tests made prior to the order of discontinuance of the Federal Radio Commission indicated that there is a decided carrier-current action on the wayside telegraph or telephone wires, whenever a head-to-rear-end radio set is in operation. A number of observers noted that there was a decided variation in the intensity of the signals, with the location of the line wires paralleling the railroad. This carrier-current action may have some bearing on the problem of securing authority from the Federal Radio Commission for the operation of head to rear-end radio sets.

Table C lists all of the telegraph printer installations made in 1929. It will be noted that the Canadian Pacific heads the list with 45 machines and 2,847 miles of printer circuits. The extension of printer circuits on this railroad has resulted in improved service to the public. The New York Central also has made an extensive addition to its printing telegraph equipment, but it will be noted from Table C that the circuit mileage on the New York Central is relatively small. Most of the printers on this road are used at terminals or at hump yards. The superintendent of telegraph reported several installations that have resulted in the expedition of traffic. On one circuit, train consists are transmitted with tape-type printers. Tape printers are also used in the new station at Buffalo for disseminating information as to train arrivals and they are being used between Mott Haven yard and Grand Central terminal, New York, to assist in the make-up of passenger trains. The economies made possible by transmitting freight train consists with page-type printers on the Missouri Pacific were disclosed in an article which appeared in the *Railway Age* of August 24, 1929, page 462.

This review, which is the tenth annual survey of the railway telegraph and telephone field, has been compiled from data received from 99 railroads in the United States and Canada.

Table A outlines the principal changes in plant facilities during 1929 and gives comparative figures for 1928. It is clearly evident that 1929 witnessed a considerable expansion in communication plant facilities over 1928. Every item shown in the table, without exception, showed an increase over 1928. New pole lines were provided, or existing lines rebuilt, to the extent of 11,519 miles in 1929. This activity represented an increase of 30 per cent over 1928.

Table D—Principal Increases in Plant Contemplated for 1930

		Miles
New or rebuilt pole lines:		
Railroad owned	1,477	
Commercial	4,893	
Jointly owned	3,246	
Total		9,616
Copper wire:		
Railroad owned	22,032	
Commercial	6,759	
Total		28,791
Road mileage dispatched by telephone		3,247
Long-distance telephone lines		8,251
Telegraph circuits (all types)		6,555
Printer circuit mileage		5,896
Printing machines		78

Work Under Construction

According to the data received, there was relatively little work under construction in the railroad telephone and telegraph field at the close of 1929. When compared with the huge volume reported as completed during 1929, it is evident that the majority of the railroads plan their construction activities in such a manner that they are able to complete most of the heavy pole line reconstruction and other outdoor work before cold weather sets in. Thirty-one roads reported that they were constructing or rebuilding about 3,000 miles of pole lines, including the work conducted by commercial telegraph companies. The volume of such work compared favorably with the corresponding amount at the end of 1928. Likewise, about 2,400 miles of railroad-

Table E—Principal Copper Wire Installations Contemplated for 1930

Road	Miles		
	Railroad Owned	Commercial	Total
N. P.	365	3,425	3,790
A. T. & S. F.	3,476	77	3,553
U. P. (System)	3,171	....	3,171
S. P.	1,235	1,440	2,675
B. & M.	1,765	761	2,526
C. M. St. P. & P.	2,256	....	2,256
N. Y. C. (System)	982	420	1,402
M. P. (System)	1,350	....	1,350
Erie	969	18	987
Wab.	975	....	975
D. & R. G. W.	900	....	900
C. & O.	745	....	745
G. N.	571	....	571

owned and 4,800 miles of commercially-owned copper wire was being strung at the end of 1929. The amount of this work was about the same as at the end of 1928. About 870 miles of long-distance telephone circuits were in process of installation at the end of 1929, while one railroad was in the midst of installing six printing telegraph machines at a hump yard at the close of the year.

Table D summarizes the principal increases in plant facilities which are contemplated for this year. These figures are based upon reports received from 51 railroads. It is hard to escape the conclusion that these figures are rather incomplete, inasmuch as only about half of the roads from whom replies were received indicated that any work was contemplated for 1930. Delay in the approving of 1930 budgets is responsible for much of this omission. Some indication of the volume of work which will be handled this year is afforded, however, by comparing the data available, with the corresponding data made public a year ago. Barring unforeseen developments, such as a decided falling off in business there is a relation between the amount of work reported as contemplated for any year and the amount actually completed in that year. Proceeding on this basis, therefore, much of value can be gained by comparing forecasts for 1930 with those for 1929.

For example, 40 railroads report that they expect to build or rebuild 9,616 miles of pole line in 1930. This estimate is 39 per cent greater than the corresponding estimate at the end of 1928. Thirty-two railroads report that 22,032 miles of railroad-owned copper wire and 6,759 miles of commercially-owned copper wire will be installed this year. Here, it would appear, that a decrease can be looked for, because this expected total, 28,791 miles of copper wire, is nearly 10,000 miles less than what was expected a year ago.

A continued increase in the road mileage dispatched by telephone is looked for, and this is also true of long distance telephone lines. What is particularly apparent, however, from the data in Table D, is the continuance of the present tendency to use printing telegraph machines to replace Morse operators and to speed up the operation of freight classification yards.

Signaling Construction

(*Continued from page 115*)

44 roads under the two orders of the Interstate Commerce Commission issued in 1922 and 1924 having been completed prior to the beginning of the year. During 1929 a few roads made voluntary installations or extensions where further safety precautions were desirable on account of special operating conditions; for example, the Boston & Maine installed an intermittent inductive train stop system through the Hoosac tunnel in Massachusetts, this five miles of double track being equipped for operating trains in either direction on either track. Likewise the Southern Pacific installed intermittent magnetic automatic train stops on 29.5 miles of double track through snow-shed territory between Emigrant Gap, Cal., and Andover.

During 1929 the Pennsylvania made extensive installations of continuous cab signaling on its lines between New York and Washington, D. C., and other installations are planned. Evidently this company intends to equip its main trunk lines with cab signaling, and although this equipment is not being installed in compliance with any order and therefore does not come under the same category as train control, so far as the commission is concerned; nevertheless the commission is keeping in close touch with the progress being made.

The railroads have complied with the suggestions made in the Interstate Commerce Commission's order of November 26, 1928, that they keep the commission advised as to work being done in train control and other safety matters, especially as relating to operation. These tabulations are given in the annual report of the Bureau of Safety, and also in the annual report of the commission, which was released on December 5, and has been published in these columns.

The railroads are also required to submit to the commission a monthly performance record report on a new form which was put into effect on July 1. This information is desired by the commission in order that it may be informed as to how the various devices are working.

No orders requiring any general installation of train control are expected to be issued in the near future.

A Review of 1929

(*Continued from page 34*)

1927 and 1928, but fell slightly below 1926. In brief, ton-miles broke the record, while carloadings missed it by a narrow margin.

Passenger traffic and revenue showed the same downward trend in 1929 as in previous years, although the rate of decline showed signs of slowing up.

Operating revenues increased, as did expenses and taxes, but efficient and economical operating methods brought a larger proportion of the gross revenues through to net operating income than in any year since the war. Total revenues were not the greatest on record, but the aggregate of net operating income surpassed previous years The rate of return was not, however, so great as in 1926, because the property investment has shown considerable increase since that year.

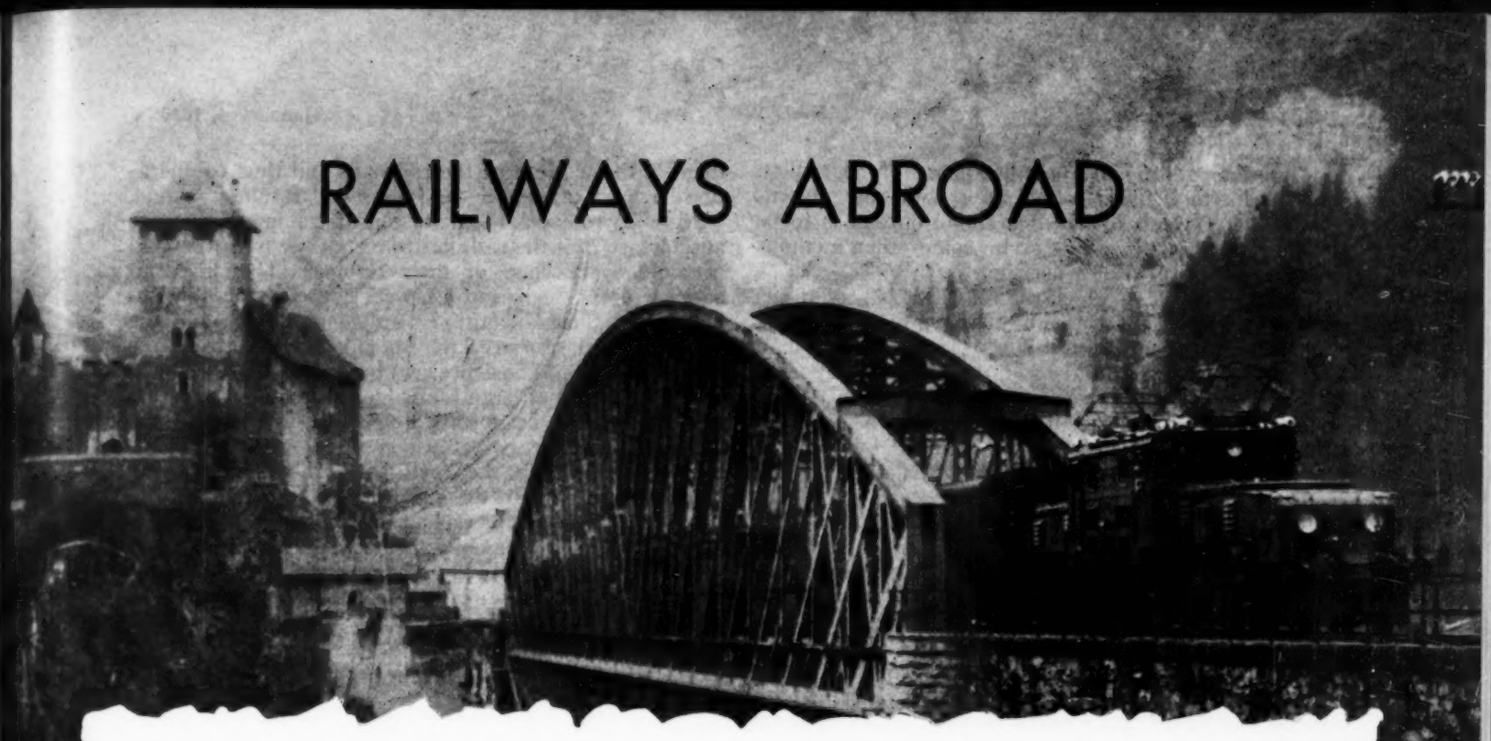
In no year since the war have the railways earned as much as five per cent on their investment. The last four years, with the heaviest freight traffic ever handled, have ranged between 4.29 per cent and 4.98 per cent. The final figure for 1929, after revision of the investment figures has been made to the end of the year, will be about 4.90 per cent.

Satisfactory progress was again made in efficiency methods, resulting in a higher level of operating performance than ever before, and in many new records for individual factors of efficiency.

Ten days before the close of the year, the Interstate Commerce Commission published its final plan for railway consolidation, which contemplates a total of nineteen railway systems in the United States. Many events will take place before this or any other plan can become effective, but the plan now becomes a tangible element in future railway programs.

As the year closed, the immediate prospect for freight traffic and revenue was clouded in considerable doubt. Will the psychological influences of the final quarter of 1929 carry their effect forward into 1930, or have they been checked? Only the next few months can reveal the answer to this query. In the meantime, the railway industry is making its contribution to stabilization of public confidence, by setting up a large capital program for 1930, and by keeping its plant ready to meet all traffic demands with greater speed and effectiveness than ever before.

RAILWAYS ABROAD



THE annual survey of railways abroad in this issue of the *Railway Age* annual statistical number is much wider in its general scope than any annual review of foreign railway activities previously attempted herein. Whereas in recent years four or five of the more important foreign countries have been selected and railway developments in them given extended treatment in separate articles, this article attempts a brief but comprehensive presentation of recent important railway developments throughout the world. In order to gather the material, contributions were invited from a representative railway authority in each of approximately two score countries. A brief summary of important recent developments with a statement of predictable prospects was asked. Suitable replies were received from the great majority of those solicited but in some cases where replies were wanting or unduly delayed it became necessary to treat a few of the countries on the basis of the latest material and statistics of their railways available in this country.

An outstanding feature of the survey is its revelation of the fact that railways generally throughout the world are confronted with many of the same problems. This is especially emphasized in the reports of the effects of automobile and motor coach competition on railway passenger revenues. Railways of some of the reporting countries have found this problem more serious than others but nevertheless the general concern which it stimulates is indicated by the fact that few of the writers failed to comment on its present effect on passenger business or on expected future losses of revenue to highway carriers.

Great Britain

The British railways have weathered the storm—the result of highway motor competition and industrial troubles. The year 1929 has been the turning point and as a result the outlook to-day is brighter than at any time since the railway amalgamations. The year has been one of many outstanding happenings. The companies have declined to increase the rates, although the standard revenue for 1928 was some millions short. Instead they have concentrated on giving better and increased facilities to the traveling public and traders alike in the form of additional cheap facilities, speedier passenger services and freight trains designed to give next morning deliveries at all important towns in the country. The container system has been extended and hundreds of country trucking services radiating from railheads at all points on the various systems introduced. New and luxurious passenger trains have been built and brought into operation, docks have been modernized and stations rebuilt. Big increases are recorded by all the companies in freight traffic.

As a result of the introduction of cheap fares and highway competition passenger revenue still continues to decline, although the number of passengers carried increases. Cooperation however, rather than competition with highway operators and local corporation undertakings is having its effect and the dangerous competitor of only a few years ago is becoming a feeder to the railways.

Among the staff there is a re-awakening of personal interest in the railway undertaking and the voluntary reduction in salary of 2½ per cent by all grades, is to continue until May, 1930. The companies themselves have continued to effect very considerable economies in operating expenses and with the close of the year far-reaching projects of improvement have been commenced, as a result of the government plan to relieve unemployment. Millions of pounds will be spent on electrification of suburban and main lines, rebuilding of stations, doubling and quadrupling lines, enlargements of classification yards, and the modernization of terminal points with a view of handling cars of 20- and 40-ton capacity. Not the least important factor is the realization by the general public of the value of the railways to the country as a whole, and this has played no small part in the outstanding happenings of 1929.

W. H. FRASER.

Germany

Again in 1929 the German National Railway (Deutsche Reichsbahn) succeeded in earning its reparations charges of 985 million gold marks. It is true that passenger revenues did not increase as much as had been expected due to a falling off in business, following the increase in rates of October, 1928. On the other hand, freight revenues exceeded the estimate so that, taken altogether, the results expected from the rate increases were attained. By reason of a wage increase which took effect in July, 1929, however, the railways

now have an additional annual expense of 55 million gold marks to meet. Conferences with the government to determine whether this added burden is to be met by an increase in rates or by some other methods have not yet resulted in a decision.

The long term loan which the railway has sought has not yet been arranged since the German money market has not been in a position to float it and a foreign loan cannot be considered until after the coming change in the railway law in connection with the Young Plan. For this reason betterment programs have been restricted to those which could be financed by drawing a few small short-term loans from a part of the liquid assets of the railway company.

Under such conditions in 1929 the railways were able only to carry out fully such maintenance and renewal operations as were necessary to continue the safety of operation. Expenditures for operating or service improvements or for large structures could be made only when an actual monetary saving would result, or when they were made necessary by traffic considerations. Among those undertaken with this latter view in mind may be mentioned the further installation of rails 30 meters long to secure easier riding; an increase in the number of heavy freight and express passenger locomotives; the placing in service of a large number of new passenger cars; an increase in train speed, restoring by and large the schedules obtaining before the war; an increase in the number of long-distance express trains; completion of electrification of the Berlin city and suburban railways and the modernization of additional station buildings. Likewise the new central station in Koenigsberg (Prussia), so much needed for transportation in that section, was completed and put into operation. Further progress also was made in the speeding up of freight service. By all these improvements, as well as by alterations in tariffs, the railways succeeded in keeping within reasonable bounds the competition of motor vehicles, which in Germany as well as elsewhere is becoming more noticeable on account of the ever increasing number of these vehicles.

REICHSBAHNRAT DR. GENEST.

Spain

While the railroads of Spain have not been particularly prosperous during 1929 there were, nevertheless, several developments worthy of mention. For the improvement of their lines and rolling stock a total of 583,815,700 pesetas ($81,150,382) was appropriated; for the construction of new lines 335,598,600 ($46,648,200) and for electrification 50,000,000 pesetas ($6,950,000). Revenues, despite the diversion of traffic to competing forms of transportation, were somewhat higher than in 1928. The Barcelona and Seville expositions were responsible for a considerable increase in the number of visitors to Spain and these latter contributed to the increased revenues. The new fast trains with modern locomotives and equipment were patronized by many of these visitors to the expositions. Rates remained unchanged during the year and it is not believed that any early revision of tariffs will be made.

Despite competition the railroads still handle the greater share of all traffic and can aid in increasing and developing it by sound management and reasonable foresight. Intensive and efficient operation of main lines and industrial branch lines will avoid the greatest danger of traffic diversion to competing forms of transportation. Encouraging the large users of the railroads, by equitable and progressive regulation, to invest their capital in railway enterprises will result in interesting them in the welfare of the railroads and thus co-operation between carriers and shippers will result.

In order to check the diversion of traffic and procure an increase in it the railroad companies must foster and promote every class of their service. They need to adopt without the loss of a moment decisive measures to counteract the competition of the automobile and the airplane. All who are interested in the welfare of the railways may well be concerned in this matter, inasmuch as this competition surely involves a grave risk for the railroads in the near future. As the inventor of the autogyro airplane, Sr. La Cierva has said, "In 1949 twenty years hence, there will be more machines flying through the air than the sum total of all vehicles destined for terrestrial transportation." Moreover, the manufacture of automobiles is every day becoming more intensive and the future volume of traffic will not be sufficient for all these mediums of transportation. The competition will be titanic and it is necessary to look ahead and take measures to prepare for any development.

VINCENTE MZ. DE LECEA.

France

Operations of the large French railway systems in 1928 were marked by a return to normal conditions and the year closed with a net of 116 million francs (one franc = 3.9175 cents) after all charges. The year 1929 has been one of heavy traffic in keeping with the industrial activity of the country and, from an economic standpoint, has been a period of adjustment to the situation created by the stabilizing of the franc on a gold basis, which was accomplished in 1928.

Because of the increase in the cost of living due to stabilization, the railways had on two occasions to increase the basic wages of their employees to bring wages on the average, in francs, to five times the prewar scale for unmarried employees coming under the provisions of the Employment Law (Statut du Personnel) and to an even higher figure for employees having families to support. The result was an increase in expenses of approximately 700,000,000 francs for the year 1929, which will be increased to almost one billion in 1930, this figure taking into account also the increases made in pension allowances.

Because of the improvement in the financial situation, loans were secured by the railways in 1929 (nearly three billion francs) on more favorable terms than heretofore, but they were still heavy by reason of the excessive taxes levied on securities. The result of these loans was an increase in fixed charges of about 200 million francs per annum.

The increase in traffic has been almost constant, compared with similar periods in 1928. At the end of October the cumulative total of cars loaded in 1929 had reached 19,067,530, or a daily average of 63,347 cars for the first ten months, as compared with a daily average of 63,000 for the same period in 1928, 60,369 in 1927 and 59,908 in 1913. Operating revenues in the first 43 weeks of the year totaled 12,775 million francs, exceeding those of the same period in 1928 by 613 million, or 5.04 per cent (an increase of 5.85 per cent in freight revenues and 2.12 in passenger revenues). It is, however, important to note that 1929 benefitted through the entire period from the 11.9 per cent increase in freight rates which was placed in effect on March 1, 1928. Since that time there have been no rate increases; in fact there have been several hundred reductions made to stimulate traffic or meet automobile competition.

Measured in gold, passenger rates are lower than

pre-war (being 68 per cent of pre-war not counting the tax, or 82 per cent including the tax) and freight rates are less than one-third higher (23 per cent greater without the tax or 35 per cent greater with it). These rates are among the lowest in Europe. These figures show how importantly taxes affect transportation in France. They amount to 32.5 on passenger rates and to an average of 7.7 on freight rates. The government will collect more than two billion francs from this source in 1929. If these taxes are added to those the railways have to pay on their valuation and the savings which the government makes by reason of reductions from standard rates for transportation service performed for government account, it is found that the total annual contribution of railroad transportation to the government amounts to approximately 3½ billion francs.

Automobile competition increased in 1929. The railways have met the situation by rate adjustments and improved service and have themselves decided to enter the field of highway transportation. The Southern (Midi) Railway continued actively its electrification program, but because of the high cost of capital, the Paris, Lyons & Mediterranean proceeded but slowly with its project and the Orleans company has not renewed activity on its program at all.

In spite of all the charges the railways have to meet, it appears that they will be able to end the year 1929 with a deficit (after dividends) of not more than 100,000,000 francs. The prospect for 1930 is not so happy, however, and may bring a deficit of five or six hundred million even without any falling off in traffic. In sum, the physical condition of the railways is satisfactory; but so long as the economic position of France and the cost of living are not stabilized, and as long as the burdensome taxation of the railways is not lightened, the railways' financial position will remain difficult.

M. Peschaud

Italy

The year 1929 has been very favorable for the Italian State Railways, a system of 16,500 kilometers. The great deficit after the world war has been eliminated by the Fascist government. The improved financial results continued during 1929, notwithstanding increases in remuneration for all the staff and great expenditures for renovation and improvement to permanent way, bridges, buildings, signaling and rolling stock. This has been possible not only on account of the greater volume of freight traffic but also because of the increase in operating efficiency and in economical personnel reorganization. Traffic during June, 1929, was the greatest of any month in the history of the Italian system. Efficiency is manifest in better utilization of coal, improved labor output and savings in the maintenance of rolling stock. The staff, which has been reduced 70,000 employees by the Fascist government (from about 240,000 to 170,000) is still decreasing. It is now restricted in numbers, but is well paid. Today 30 workers perform the same work as did 39 before the war. It may be further said that scientific management is being extended. Calculating and selecting machines (Hollerith and Powers type) are used in many offices.

The competition of the automobile for passenger and freight traffic is increasing. During the winter and the summer there are operated special fast trains of first-class Pullman cars. An extension of electrification is in progress on five important lines and is projected on three lines around Triest. In the near future a third of the Italian lines will be electrically operated. New rolling stock and new large stations are under construction; Milan will have a monumental edifice and one of the largest yards of Europe. About 500 kilometers of new lines are being constructed and on the "Direttissima" (the new low-grade high speed line from Florence to Bologna) is being built a tunnel of 18,500 kilometers, one of the largest in the world. On the whole, it may be said that the Italian railways during 1929 were operated with great regularity and efficiency and that 1930 will be a successful year.

Nestore Giovene.

Russia

Expansion of the entire national economy, resulting in increased loadings of coal, oil, timber, metals, etc., and in more extensive passenger travel, was the underlying reason for the good showing of railways throughout Soviet Russia during the fiscal year ended September 30, 1929.

Revenues for the year totaled 2,025,000,000 rubles, ($1,042,800,000), an increase of 195,000,000 rubles over the anticipated revenues and of 301,000,000 rubles over those for the fiscal year ending in 1928. On the other hand, better utilization of rolling stock, introduction of the pooling system for locomotives and crews, reduction of the number of cars held for repair and improvement of interchange operations between different lines kept expenses from increasing in the same proportion, and contributed to reduce the operating ratio from 80 per cent in 1928 to 74 per cent for the year just past.

Freight operations increased 16 per cent over those of 1928, or more than double the increase called for in the five-year budget under which the Soviet railways are now being operated. During the year, 177,000,000 tons of freight were carried the equivalent of 67,000,000,000 ton-miles, as against 54,648,000,000 ton-miles operated in 1928 and 40,737,600,000 in 1913. Improvements in passenger service, enlarged buying capacity and an unexpectedly great mass migration of seasonal workers also resulted in a 16 per cent increase in passenger traffic, which totaled approximately 17,884,800,000 passenger-miles.

Capital investments during the year amounted to 927,000,000 rubles, against a planned figure of 844 million and a 1927-1928 figure of 757 million. Of the 1929 total, 128 million rubles were spent on the construction of new lines and the remainder went into the laying of heavy rail and creosoted ties, the installation of feed water heaters on locomotives and air brakes on freight cars, reconstruction of yards and bridges, experimental electrificaton of a suburban line in the vicinity of Moscow and social work among railway employees.

Eleven new lines, with a total length of 11,039 kilometers (6,855 miles) are under construction. Of these, the more important are the Ural-Kurgan section between Siberia and European Russia; the Kuznetz-Osinov line, connecting the Osinov coal fields with the Kuznetz industrial district; the Merefa-Kherson section, which will shorten the distance from the Ukrainian capital of Kharkov to the Black Sea port of Kherson by nearly 100 miles, and the Turkestan-Siberian railway, connecting Semipalatinsk in Siberia with the Tashkent Railway, and shortening the distance between Tashkent, the chief city of central Asia, and Novosibirsk, the capital of Siberia, by 1,800 kilometers (over 1,100 miles). This line, which also opens up some 27,000,000 acres of virgin timberland, and several shorter sections, will be opened to traffic in 1930, well ahead of schedule.

During 1929-1930—the second year of the "Five-year

Plan"—the Soviet Railway Administration anticipates an increase of from 16 to 18 per cent in traffic, while expenses are expected to increase only 4 or 5 per cent, with an operating ratio of approximately 65 per cent. Since all railway debts to the State Bank were paid from revenue during 1929, excess revenue in 1930 will be devoted to capital expenditures. The present budget calls for an investment of 870,000,000 rubles in improvements and additions to existing lines and equipment and of 320,000,000 rubles for the completion of new lines now under construction and four additional sections, totaling slightly over 1,000 miles, on which work is to be started in 1930.

Poland

Practically all Polish railways are owned by the state. They are now in process of reorganization and reconstruction for operation upon strict business principles. The first steps in this direction have already been taken; the Ministry of Communication and the various railway systems themselves are now conducted on a well-conceived commercial basis. An accurate valuation of the property of the Polish State Railways is the next task, and that is now practically finished.

In view of an exceptionally severe winter, which cost the Polish State Railways $8,000,000, the year 1929 was somewhat unfavorable. However, income exceeded expenses, and from time to time made possible the transfer of large sums of the net income to the state treasury. The railroad receipts for the period 1928-29 show an increase of 7.4 per cent over the previous year. Unusual expenses, involving outlay for the improvement of existing lines and the building of new ones, reached in the 1928-29 budget year the sum of $26,000,000. It is noteworthy that the Polish railways, now considered among the best in Europe, had to begin ten years ago from the very foundations, building from the tangled ruins left after the war. Enormous investment expenses were occasioned by the fundamental reconstruction work, necessitated by the greatest war losses that any railroad had ever experienced; but due to these investment expenses, the Polish State Railways show a constantly increasing earning power. The freight rates, however, recently had to be increased by 20 per cent.

There is continuous progress in the technical realm. Roadbeds are being improved and heavier rails installed. Closely connected with this is steady improvement in signal apparatus, of which very little was left by the contending armies who occupied Poland during the war. New rails, locomotives, and freight and passenger cars are now supplied entirely by Polish foundries and car works, which are constructing modern types both of locomotives and cars. These factories have this year supplied 3,000 freight cars and 200 passenger cars.

The Polish State Railroads have 180,000 employees. Labor conditions are constantly being improved; for instance, a 15 per cent increase in wages and pensions has recently been granted.

With regard to the building of new lines, Poland is now chiefly occupied with its greatest construction task, the establishing of a main coal line, which would haul the Upper Silesian coal by a direct line several hundred miles long to the seaport of Gdynia, facilitating a more intensive export of Polish coal to foreign markets. This line is practically completed and traffic is established on many sections. With regard to buildings, the work of restoring the thousands of stations, bridges, stores, and railroad employees houses destroyed during the war, was continued during 1929 and has now been completed. Electrification will soon begin, as part of the reconstruction of the large Warsaw main station and track system; the electrification of the Warsaw suburban narrow gage railroad is planned in the near future. To meet the competition of motor coaches, the Ministry of Communication is planning to organize its own highway service along those routes which are most threatened by private motor enterprises.

In general it is necessary to state that the Polish State Railways, in spite of exceptionally difficult conditions, have during the first ten years of their existence attained the standard European level, have accomplished the work of post-war reconstruction, have become completely modern, and are continually progressing.

DR. WACLAW ZAWISZA.

Czechoslovakia

The year 1929 was one of comparative prosperity for the Czechoslovakian railways because of the favorable trade situation of the country. Mileage at the beginning of the year was 14,162 km., (8,795 miles), of which 13,400 km. were operated by the Czechoslovakian State Railways. During 1929 two small sections, both connecting the agricultural Slovak east with the industrial Bohemian west, and totaling about 50 kms., were completed. One important connecting link between Handlova and Horni Stubna is in construction, at a cost of 140 million crowns ($4,200,000). Besides the building of new lines investment activity was directed toward unification and reorganization of terminal services in Prague, Brno and Bratislava; renewal of about 437 kilometers of roadway; construction of 615 new sidings; and introduction of motor coach operation to provide more frequent connections and meet increasing highway competition.

Although a very severe winter in 1928-29 proved a serious handicap to railway operation early in 1929, operating results for the year were satisfactory. Whereas in 1928 a total of 269,341,832 passengers were carried, an increase of 7.25 per cent over 1927, the first six months of 1929 show a further increase of more than 2,000,000, with a six months' total of 127,330,000. The same favorable development existed in freight transportation.

The main handicaps of the railway service were the comparatively low speed of passenger trains, which is still under the pre-war level, with the fastest expresses averaging only 39 m.p.h.; the occasional train delays; and the shortage of cars in times of heavy requirements. These shortcomings are explained by the lack of financial means for adequate maintenance, quick modernization and necessary extensions of the lines and terminals. The railways are obliged to transmit to the state yearly about 800 million crowns ($24,000,000) as a transportation tax, of which they receive back only 25 per cent for investment purposes. Under such conditions it is only natural that roadway renewal can hardly be higher than 2 per cent of the whole mileage, and that modernization of the lines can be carried out much more slowly than desirable. In this direction as well as in that of a true commercialization of the system main effort will be concentrated in the future.

The railway budget for 1929 includes a net revenue of 155,000,000 crowns, while gross receipts for the first six months were 2,063,000,000 crowns, or 17,200,000 more than in 1928. The greatest increase in revenue was from freight transportation, which produced 15,710,000 crowns more revenue than in the first half of 1928. For investment purposes the railways have at their dis-

posal in 1929 the assumed net operating revenue of 156,990,000 crowns and the 25 per cent share of the transportation tax, amounting to 175,600,000 crowns, or approximately 24,700 crowns per operated railway mile.

Density of freight traffic is 45 per cent lower than in Germany, for instance, or about 1,247 tons per route km., practically the same as before the war. On the other hand, density of passenger traffic is twice as great as before the war, but is not profitable because about 96 per cent of the passengers travel third-class or on reduced fares. Most of the freight carried is of comparatively little value, and consequently, able to bear only low rates. Also, lower exceptional export tariffs are granted in many cases for reasons of general economic policy, so that Czechoslovakian railways, though economically self-supporting, still present a difficult economic problem. DR. V. PARTL.

Denmark

The operating results of the Danish State Railways during the past year were somewhat better than the year before in that income exceeded expenditures (exclusive of sinking fund charges and interest) by 2,500,000 kroner ($670,000), while in the previous year there was a deficit of 1,500,000 kroner ($402,000). This improvement is in part due to an increase in income (in spite of rate decreases) and in part to the decrease in expenditures, especially for fuel.

Different plans have been attempted to meet the strong competition of highway carriers. With respect to passenger traffic the railways have, among other things, introduced round-trip tickets at reduced rates and established special excursion trains in connection with which all-expense tours have been arranged for special parties. With respect to freight traffic there was introduced in 1927 a large reduction of rates and an attempt was made in 1928 to obtain traffic through agreements for special rate reductions with the larger shippers and through a special direct service for forwarding agencies. Moreover, there was established collection and delivery of freight by motor truck to and from the railroad stations. The construction of new lines has practically stopped. On the other hand, however, several large bridge projects are in preparation, an important one being the railroad and highway bridge with a length of 1175 meters over Lille Baelt at a cost of about 20,000,000 kroner ($5,360,000). Several of the largest stations have been reconstructed and furnished with modern electrical equipment.

The rolling stock is steadily being augmented with modern cars and internal combustion locomotives of various types, including diesel-electric. The new modern equipment has made possible a notable increase in speed. About 8 per cent of traffic is now hauled by internal combustion power. To handle local traffic around Copenhagen, a new type of passenger car with upholstered seats for third-class passengers has been introduced. This type of third-class coach is also being used on the through trains.

The three-track diesel-engine ferry acquired in 1927 for through traffic operated satisfactorily in 1928. Now it is planned to build for this service a new three-track ferry and a special ferry for the accommodation of automobiles, the number of which is rapidly increasing.

In the near future the electrification of lines surrounding Copenhagen is planned, The expenditure of the first installation for this is estimated at about 20,000,000 kroner.

With the help of such modernizing and increased facilities and equipment, together with the adjustment of tariffs to present needs, it is hoped that the State Railways will meet the competition of the automobile. With the short distances of the country and its splendid roads, this highway competition has especially favorable conditions. E. TERKELSEN.

Austria

The course of the Austrian Federal Railways has been upward for the past several years. Improvement in internal affairs in Austria itself, as well as a return to more nearly normal conditions all over the European continent, have combined to bring about this progress.

After being separated from the railway administrations of the nations which were formed out of pre-war Austria and the settlement of questions of ownership, the Austrian Federal Railways were in a position to proceed with the rehabilitation and improvement of their lines and, taking all conditions into consideration, to place operations on a sound basis.

The improvement plan included the roadbed, stations, structures, train protective installations as well as rolling equipment, and was entered upon on the basis of a program extending over years, utilizing every means available.

Revenues were increased thanks to a well-planned tariff policy, which was designed so as not, at the same time, to work any hardship on the economic life of the country. Operating results are unfavorably affected by the heavy labor expense. Since the employees in service, in spite of the new work under way did not conform to the actual labor requirements, each undertaking necessitated increasing the pension list, already too large and wage expenses for active employees continued to grow without the hiring of any new men, simply because of the automatic promotions based on length of service.

A certain decline has already taken place, to be sure, and we are gradually reducing the active staff to the number actually needed. Still when this goal is reached the natural decline will burden anew the pension list while the curve of the pensioners to be cared for by the Pension Institute will not take a downward trend for some time but rather will remain stable until the normal number of pensioners is reached.

Nevertheless it can now be said that rapid progress is being made. Track structures and safety devices are meeting the heavier demands made upon them, the modernization of equipment continues and train service is increased to meet the demands of the service.

New railway construction of great extent is not to be expected in Austria. Construction will be restricted to a few local lines and even in such cases progress must be slow since there is difficulty in finding the wherewithal. The scarcity of funds and the unfavorable conditions under which they must be obtained for such purposes is the principal reason why the Federal Railways have had to postpone temporarily their electrification program. RUD. FOEST-MONSHOFF.

Norway

The year 1929 cannot be described as a prosperous one for the railways in Norway. Receipts have continued to decline, partly because of reductions in the freight rates and partly on account of the steady and large decrease in passenger traffic resulting from the extended use of automobiles. The State Railways, which comprise the vast majority of the railroads in the country, reported in 1928-29 slightly better financial results than in the previous year, owing to reduction of expenses. The traffic yielded a small surplus of profit (without allowing for interest on capital).

Freight traffic shows some increase. Labor conditions have been satisfactory and the traffic has proceeded without any great disturbances or accidents. No new lines have been opened, but considerable improvement and strengthening work has been carried out on the older tracks. The supply of rolling stock has been increased by a number of rail-motor cars. Electrification has been extended by 46 kilometers and several new lines are under construction, including the Nordland Railroad and the Sörland Railroad. The private railways, all of which are local roads of subordinate importance, are for the most part working under unfavorable conditions and, generally speaking, with unsatisfactory results.

O. HOLTMON.

Hungary

There were no outstanding developments in the railway situation of Hungary during 1929. Both passenger and freight traffic remained at approximately the same level as in the previous year and no important rate changes were inaugurated. There were, however, slight rate reductions to stimulate the movement of freight for export. These decreases did not materially affect freight revenues. Attempts at "rationalization" (application of the methods of scientific management to operating methods and to determine the wisdom of capital expenditures) are in progress. Because of the present scarcity of capital in the country, these attempts have as yet shown results only in their administrative reorganization features.

Passenger traffic as a whole during the year remained unchanged, although certain changes were noted. The advent of the automobile has diverted some short-distance travelers from the railways but the increase in long-haul business neutralized this diversion. Thus the net effect of automobile competition on passenger traffic is at present unimportant. This is partly because of the fact that any extensive use of highway motor vehicles is only just beginning in Hungary; another factor is the poor condition of the country's roads, brought on by the lack of capital, which deficiency retards both new highway construction and the upkeep of existing roads. Because of the highway competition already present and anticipating further inroads into passenger traffic from this source, the Hungarian railways have taken several important steps to meet the contingency. Mixed trains have been discontinued on branch lines and passenger service thereby accelerated. Rail motor cars have been placed on some runs. Furthermore, the railways have joined in the formation of a corporation for the operation of motor vehicles on the highways. This highway concern was organized two years ago and the Hungarian State Railways have a 50 per cent interest in it. It is not possible, however, at this time to appraise its value to the railways.

Plans are under way for the execution with the aid of foreign loans of several improvement programs. These are mainly reconstruction projects, such as the installation of heavier rails and the modernization of the signaling system. Development of the country's natural power resources is expected to aid in the extension of electrification. On the Budapest-Vienna main line a section 112 kilometers in length is expected to be converted to electric operation within the next two years.

Labor conditions remain unsatisfactory, especially insofar as remuneration is concerned. The heavy financial burdens which the Treaty of Versailles imposed upon Hungary have made it necessary to reduce the salaries of railway officers and workers to a level which is 50 to 60 per cent below their pre-war wages. As a result the standard of living among railway workers has been greatly depressed. Speaking generally it may be said that Hungarian railways progressed but slightly during the past year and that 1930 results will depend chiefly upon the ability of these lines to attract capital necessary for desirable improvements.

DR. G. PRUZSINSKY.

Netherlands

Gross revenues of the Netherlands railways were greater in 1929 than in 1928 despite the fact that the receipts of the latter year were augmented by an increase in passenger traffic during the Olympic games. Because of the great network of inland waterways, the receipts from passenger traffic have always been a large part of the total railway revenues. In 1928 passenger business accounted for 48.3 per cent of the gross. In contrast to the experience of railways in many other parts of the world, the passenger traffic of these Netherland lines has been increasing, thus indicating that the growing use of automobiles has not yet cut seriously into railway revenues. The influence of this highway competition is partly mitigated by the extension of electrification which has caused many passengers to return to the railways. Also, the railways have themselves organized motor coach and motor truck services, but legal conditions attending these highway operations make their development at the present quite difficult.

Labor conditions are in general satisfactory, although many trade union negotiations are pending. Because of the favorable operating results of the past two years, it has been possible to place large orders for new equipment, including a number of heavy locomotives and additional freight cars. These will be built during the year. During 1929 a new light railway was opened in the Province of Groningen and two new lines are projected for completion in 1930. Electrification is in progress between Amsterdam and Alkmaar. Because of the rapid development of Amsterdam and Rotterdam, the railway has decided to remodel its facilities in these centers and plans have now been completed for these projects.

Signaling has been extended with experiments with automatic block system being conducted on two sections of the line. These automatic block signals have produced such satisfactory results that they will be installed on several other lines. Furthermore, increased traffic during the year has made necessary some double tracking. In conclusion it might be stated that the outlook for 1930 is favorable and that the Netherlands railways are not yet greatly concerned with the competition of the automobile.

W. J. NIERMEYER.

Bulgaria

Bulgarian railways at the close of their latest fiscal year covered a total of 2,915 kilometers of which 2,422 kilometers were standard gage lines and 493 kilometers narrow gage. In addition there are at present under construction 640 kilometers. The administration of these Bulgarian lines, together with that of its ports, is under the supervision of a general directorate.

Gross railway revenues during the latest fiscal year amounted to 1,069,862,801 lewa; total expenses were 749,264,923 lewa and the operating ratio 70. Recently there has been installed a new system of accounting which places financial records on a more scientific basis.

Of the freight traffic handled coal is the commodity which accounts for the greatest tonnage; next is grain and grain products. During the past year a total of

3,062,412 long tons were hauled and 8,079,718 passengers carried. Highway transportation is developing rapidly and the effect of this competition is noted in railway revenues. As yet Bulgaria has no regular airplane transportation lines. LUBEN BOSHKOFF.

Switzerland

In reviewing the activities of the Swiss railways during 1929 it may be stated that the favorable development of traffic during the preceding year has continued. Good weather and reduced fares stimulated passenger travel, while freight traffic has been influenced favorably by the improved economic situation. The railways, and in particular the Swiss Federal Railways, have at last succeeded not only in extricating themselves from budget deficits, but, have, this year, again reported a net profit. This latter was accomplished despite the fact that freight rates were reduced on August 1, a measure which was dictated by the development of other means of transport and by considerations of political economy.

Important lines which were electrified during 1928 contributed greatly to the 1929 net profit. Operating expenses on these lines were reduced by five million francs in comparison to the costs under steam operation. Further favorable results of the electrification were the increased capacity of the line, augmented train speeds and the heavier loading of trains. Moreover, the "Swiss Express A.P.", which was founded some years ago by the Swiss Federal Railways, and which has taken over important trucking services at different localities, operated during the year with favorable results. Improved efficiency has also followed the reorganization of shop facilities and the reduction of the staff.

With the exception of the severe weather during last February, one of the coldest periods for Central Europe during the past hundred years, there have not been any particular difficulties in the operation of the railways. In the course of the past year there has been brought under electric operation the Visp-Zermatt mountain railway, which for 39 years had been operated by steam. Preparations are also being made by the Swiss Federal Railways for the electrification of the second part of their lines.

In the course of the past year there have been provisionally enforced a new distribution of employment and a salary law for the employees of the Swiss Federal Railways. Though all the demands of the employees have not been completely settled, it may be said, on the whole, that the railway staff is satisfied. Other features of personnel management are the payment of bonuses for useful suggestions concerning improvements in the service and rewards for distinguished service among the employees. In general it may be said that the Swiss Railways have made good progress and that they may look confidently into the future. I. GOETTLER.

Argentina

Favorable business conditions attending the marked agricultural prosperity of the Argentine Republic greatly augmented the railway earnings of that country during the year ending June 30, 1929. The six principal railways, the Buenos Aires & Pacific, the Buenos Aires Western, the Buenos Aires Great Southern, the Central Argentine, the Entre Rios and the Argentine North Eastern, reported for this last fiscal period a combined net revenue equivalent to $68,470,000. This represents an increase of $1,681,200 over the combined net revenue of the previous year. The Entre Rios was the only railroad of the group to report a decrease in net revenue, the drop amounting to $52,700. This prosperity was reflected in the dividends paid. The Buenos Aires & Pacific, the Buenos Aires Western and the Entre Rios, for the year ending June 30, 1929, each paid seven per cent dividends on common stock while the Buenos Aires Great Southern distributed eight per cent.

Several important railway construction projects are under way in the republic. Plans were recently formulated by the Central Argentine for the construction of a 390-mile line to link up Villa del Rosario and Cordoba with the road's main line to Tucuman. This project is expected to cost about $21,840,000, while an expenditure of $36,000,000 is planned for the construction of another 680 miles of line, mostly in the northern part of the country. Other projected expenditures are $8,400,000 for the electrification of the Central Argentine's Buenos Aires suburban lines and $18,000,000 for grade crossing elimination and increased trackage in the same city.

Chile

Railways of Chile experienced a marked increase in traffic during 1929 as compared with 1928. For the first six months of the current year all railways of the country produced 893,600,000 freight ton-kilometers as compared with a freight ton-kilometer production of 767,200,000 during the corresponding half of 1928. The government lines which comprise the majority of Chilean railway mileage have reported a net income for each year since 1921. This net income in 1928 amounted to 13,759,334 pesos ($1,678,600) after a deduction of more than 20,000,000 pesos ($2,440,000) paid to the government. This payment is a participation in profits computed at three per cent on the capital of some 682,000,000 pesos ($83,204,000) which has been supplied by the government for railway construction and equipment. Nineteen twenty-eight was the first year in which this government participation in earnings was paid. Thus the 1928 net revenue to be compared with 1927 must include the payment. The comparable figures then are 1928, 34,209,714 pesos; 1927, 9,835,147 pesos.

Although traffic has grown steadily much of the increased net is due to reduced expenses. In 1925 when gross revenues were 223,000,000 pesos, expenses were 215,000,000 pesos. Yet in 1928 with gross revenue of 251,000,000 pesos, an increase of 28,000,000 pesos over the 1925 figure, 1928 expenses were above those of 1925 by only 2,000,000 pesos. Among these operating economy measures is that involving a reduction of the staff. In 1922 there were 23,598 employees, whereas in 1927, despite the traffic growth, this number had been reduced to 20,550. Progress has also been made in safety work and fuel conservation. Important construction work in progress or projected includes: Shop facilities at San Bernardo, Valparaiso, warehouses at Baron, Santiago, and double-tracking between San Francisco and Rancagua. Finally, the studies on a trans-Andine line by way of Salta, to cost about 70,000,000 pesos, and a line from Lebu to Los Sauces, to cost 15,800,000 pesos have recently been completed.

Bolivia

The Bolivian railroad system at the end of 1929 reached a total of 2,132 kilometers, there being under construction 187 kilometers on the lines between Cochabamba and Santa Cruz, and between Potosi and Sucre. The tracks of the railroads of this country are of uniform gage—one meter—a condition which, in South America, exists only in Uruguay and in Bolivia. Of

the railroads in Bolivia, 777 kilometers, or 36 per cent, are private enterprises; 671 kilometers, or 31 per cent, are the property of the Bolivia Railway Company, the state owning a considerable proportion of its shares; the remainder, 684 kilometers, or 33 per cent, belong exclusively to the state.

The greater part of the private lines are enjoying prosperity, and a certain increase in traffic in general can be noted on all. But the importance of the railway system of Bolivia does not really correspond to the development of its traffic, which, due to the sparse population of the country, is still light, especially when compared with the lines of other South American countries. The importance of the Bolivian system is in having completed in a satisfactory manner its link in the union of the railroads of neighboring countries, principally Argentina and Chile, so that there now exists direct communication and interchange between La Paz (Bolivia) and Buenos Aires (Argentina) as well as between La Paz and Arica or Antofagasta (Chile) by means of uniform gage lines. In South America there are no other three countries with greater territory, greater present and latent riches and greater population which are similarly bound by railroad lines of uniform gage. The construction program of a Pan-American Railroad is thus concluded, and satisfactorily, so far as Bolivia is concerned.

Recently international passenger service has been improved considerably between La Paz and Buenos Aires, and between La Paz and Antofagasta. The journey to Buenos Aires, which formerly required approximately five days, can now be made, once a week, in only 74 hours, the trains having all desirable accommodations for such a journey. Between La Paz and Antofagasta, due to the uniformity of the gage established during the present year, the journey has been shortened by eight hours, and can now be made in less than 30 hours.

The importance of the lines under construction in Bolivia is based principally upon the realization of a plan to link the mining zone of the west, in actual operation, with the plains of the east, with their rich cattle lands and oil fields, and possibilities for the development of agriculture, so that in the near future it will be possible to supply a good part of the needs of the country for necessities of life and raw materials for industry, now imported from other countries.

The development and increase of traffic in this country in 1930 will depend very much upon the price of metals in the world markets. If these prices do not suffer much depression, the prospects are very good that the traffic in mineral ores will continue to increase, as it has during recent years. C. TEJADA SORZANO.

Peru

The year 1929 marks a turning point in Peruvian railway history. Practically the entire railway mileage in Perú has been constructed by the government; the two most important railways—the Central and the Southern—being amongst those built during the 'seventies and 'eighties under the driving force of the master railroad builder, Henry Meiggs. In the 'nineties the existing railways (at that time amounting to approximately 1,000 miles) were leased for ninety-nine years to the Peruvian Corporation; this being ratified in an agreement cancelling Perú's foreign indebtedness. By a contract, signed at the beginning of the present year, all government-owned lines—with one minor exception—which were included in the arrangement referred to above, pass in perpetuity to the Peruvian Corporation. Such, in short, is the recent history of the earlier railways built in Perú.

Government railways, built since the government debt cancellation agreement was entered into with the Peruvian Corporation, amount to only 350 miles, and a further 470 miles are under construction, or authorized, as part of the government plan of rail extension. The cost of construction is enormous. Most lines to develop effectively the resources of Perú must pierce the main range of the Andes. Such construction encounters untold difficulties.

Broadly, it may be said that there is no rail competition in Perú, and also that main freight and passenger business has been unaffected by road competition. This latter, however, has seriously affected the suburban and short-haul business on the coastal sections of most of the railways, and steps are being taken to meet it by the establishment of efficient highway services. Peruvian railways generally are nevertheless more fortunate than most European and American roads in that their main revenue is derived from long distance passenger traffic to and from the interior and the coast, and from equally long distance movements of imports into the interior and products (exports) out to the coast. Such traffic can never be threatened by road competition. It must not be thought, however, that this fact is allowed to blind the railway managements to the vital necessity of constantly improving their services to the public, and, at the same time, reducing rates in fair ratio to economies made in operating costs.

The Peruvian Corporation, as a British company, naturally draws upon England for its supply of locomotives, rolling stock and material generally and now has on order double articulated locomotives of the Beyer-Garratt type, with which it is hoped to effect substantial economies in the operation of the service on the severe mountain grade—from sea-level to 15,880 feet in one hundred miles. If successful, these locomotives will undoubtedly be adopted as standard types for mountain freight service, or will be followed by others more powerful. The American-owned and operated Cerro de Pasco Railway has lately placed in service standard all-steel coaches, and these have given eminently satisfactory results; however, such coaches are out of the question for use on the Central and Southern Railways with ruling gradient of over 4 per cent.

The prospects for the future are exceedingly bright. It may be safely stated that, under the enlightened administration of President Leguia, Perú has very definitely entered upon a period of steady development which temporary set-backs, if and when they come, cannot seriously hinder. The railways of Perú play an integrally important part in this development. The year drawing to a close has realized the hopes of increasing revenue—both passenger and freight—while at the same time services have been improved and rates have been lowered. GEOFFREY W. MORKILL.

Colombia

The beginning of 1929 found Colombia confronting financial difficulty which soon culminated in its inability to arrange, upon a satisfactory basis, the external loans necessary for the prosecution of extensive railway and highway construction programs initiated and carried over from the previous year. Consequently the work upon some projects was stopped and upon others curtailed. The country is suffering a general financial and economic depression and early this year there was organized a National Council of Ways of Communica-

tion, composed of foreign and national members, under whose direction the government revised existing programs of construction.

Nothwithstanding significant reductions in resources available, the year 1929 will see the following work completed or materially advanced: (1) Extension of the Narinian Railway from Tumaco to a connection with a highway extending to Pasto, the capital of Narino. (2) The Nacederos-Armenia Railway has been completed, connecting Manizales via the Caldas Railway to Armenia and serving an important coffee producing section of the country. (3) The railway from Cucuta toward Pamplona will soon be completed to El Diamante. (4) The Tolima-Huila-Cagneta Railway will be extended to Neiva. (5) The Ambela-Ibagué Railway is nearly completed. (6) The steel railway bridge across the Magdalena river which has been under construction for some years will be completed and will connect the railway lines from Ambalema, Ibagué and Neiva with the Girardot Railroad now operating from the east side of the Magdalena river to the capital of the country, Bogotá. This represents significant progress toward realization of the transportation system, for the lack of which Colombia's development has so suffered. (7) The railway from Puerto Wilches on the east side of the lower Magdalena river will soon be completed to Rio Negro but it will be some time before this line will have been completed to a rail connection from Bogotá.

Mention should be made of the fact that the motor highway over the Central Andes mountains between Ibagué and Armenia, opened for traffic in December, 1928, has greatly facilitated travel between Bogotá and the Pacific coast at Buenaventura. This route to Panama, the United States and Europe bids fair to take much of the passenger business from the Magdalena river, Barranquilla, Puerto Colombia and Cartagena route to the Atlantic.

It was contemplated that the functions of the National Council of Ways of Communication would be significantly extended to include tariffs and operation of completed national railways but the recently adjourned Congress did not pass the proposed law covering the extension desired by the Ministry of Public Works, under whose direction all national railways are constructed and operated. On account of unsatisfactory results obtained from government operation it is frequently suggested that public control should be replaced by some form of private management. Such a change is unlikely before the government has tried some of the means which any private operation would include, viz., an authoritative administrative head; some more freedom from political influence in the selection and discipline of personnel; employment of a few individuals devoted to the problems of tariff arrangement and industrial development. Much better operating results can be obtained as indicated, for example, by the fact that revenues less operating expenses upon the Pacific Railway for the first eight months of the crisis year 1929 were 30 per cent more than they were for the whole of 1928, this being the result of some attention to cost and cost-affecting factors.

B. B. MILNER

Ecuador

So far as the railway situation in Ecuador is concerned, Dr. Guerro Martinez, president of the Senate and acting president of the Republic in the place of President Cordoba, absent from the capital, Quito, on account of illness, was the "man of the hour" when, in 1925, he bought arbitrarily for the Ecuadorian government controlling shares in the vitally important Guayaquil & Quito Railway, built and operated by a New Jersey corporation between the Pacific coast city of Guayaquil and the interior capital city Quito. Thus ended years of conflict between the government and people generally of Ecuador and the foreign railway management. The passage of control to the Ecuadorian government did not immediately improve operating results but it did facilitate the effective work of the financial commission headed by Dr. E. W. Kemmerer under which the property was rescued from bankruptcy.

At the beginning of 1927 the railway stood to suspend operations unless assisted. Within that year however all operating obligations, many long-standing and overdue, were paid, credit in New York was re-established and a considerable surplus was accumulated making possible the provision of new rolling stock and other facilities.

For the railroads of Ecuador generally, the year 1929 has been one marking consistent participation in the continued economic progress of the country which was initiated in 1927. The Quito-Esmeraldas Railway, a long since projected line from Quito to the part of San Lorenzo at the northwest corner of the country, has been operating satisfactorily as far as Ibarra, that is, for about half of the projected distance, and construction work beyond Ibarra is under way. Construction on the Puerto Bolivar-Loja, Sibambe-Cuenca and the Manabi lines is progressing, the finished grading being used as motor highways pending the laying of ties and rail, as was the case for some time on the Quito-Esmeraldas line between Quito and Ibarra.

Highway construction between Ibarra and the Colombian frontier at Tulcan is progressing rapidly so that, ultimately, the railway and highway systems of the interior of Colombia will be connected to those of Ecuador. Motor highway service between Quito and Ibarra which was interrupted with the laying of ties and rail upon the Quito-Esmeraldas Railway, will shortly be renewed by the completion of the highway and bridge across the Guallabamba river canyon, giving both motor highway and railway service through Quito and between Ibarra and Riobamba, 125 miles south of Quito. The Guayaquil-a-la-Costa Railway is operating to the Pacific ocean so that, for Ecuador's transportation system, 1929 has been a year of marked progress.

B. B. MILNER.

Cuba

The railroads of Cuba may look forward to an average of the past two years in traffic during 1929-30 and, with the betterment of the economic condition of the Island, the possibility of an increase in some classes of the freight business. The welfare of Cuba is to a great degree dependent on the prosperity of the chief industry of the country, the sugar crop. Sugar prices have been low for the past few years but recent forecasts indicate a smaller crop this year than last, which should result in a better price for the coming crop. Firmer sugar prices increase national prosperity and any increase in purchasing power of the shippers and passengers will have their reflex in the railroads. The policy of the Cuban government has been to establish rates that would permit a fair return, allowing for capital improvements, and the maintenance of the wages of railroad labor. Any other policy would naturally lead to the curtailment of these items, with the consequent effects of such retrenchments. The character of traffic is seasonal, the peak coming in the months of sugar

production, from January to June. In that period, as in the case of certain coal roads in the United States, there is comparatively little return freight from the seaports. Transportation at this time is complicated by the movement of hundreds of special cane trains carrying the raw material to the sugar mills. H. S. RUBENS.

Honduras

The Honduras National Railway, operated since 1920 by the Cuyamel Fruit Company under contract with the Government of Honduras, has, for the past five years, reported a profit. During the last fiscal year the gross revenues amounted to $542,000, operating expenses, $311,000 and net revenues, $231,000, or 42.66 per cent of the gross. No important extensions or improvements are contemplated in the near future. Prospects of the road are promising since it receives considerable freight from Puerto Cortes consigned to the interior of the country. This tonnage, no doubt, will continue to increase. M. J. FERRER.

Barbados

As with many other railways throughout the world, the most important problem now confronting the Barbados Government Railway is that of meeting increasing competition from highway freight and passenger carriers. Drastic reductions of both freight and passenger rates have recently been made and it is hoped by these measures that the railway will be able to hold its own against such competition in the future. The main line of the Barbados Government Railway is 24 miles long and of 2 ft. 6 in. gage. Its rolling stock consists of five locomotives, ten passenger train cars and 120 freight cars. Passengers carried average about 95,000 per year and freight traffic about 35,000 tons. This latter consists mainly of sugar, molasses, cane and stone. No new extensions of the line are contemplated but a heavy program of reconstruction has been in progress during the past five years. P. P. HIGGINS.

Guatemala and Salvador

The International Railways of Central America, a New Jersey Corporation with main offices in New York, has the distinction of being the largest railroad owned and operated by Americans in any foreign country, operating 800 miles of main line in Guatemala and Salvador.

The outstanding event of the past year was the opening of the connecting link between the two countries, thus not only consolidating the system and permitting intercommunication by rail between their two capitals and incidentally with Mexico, but also, a matter of the utmost importance, giving Salvador access to the Atlantic via Puerto Barrios. This connection to the Atlantic effects a saving of time to passengers and on imports and exports from and to Salvador of from 7 to 14 days, or even longer, as compared with the time necessary for passage through the Panama Canal or trans-shipment across the isthmus at that point.

This railway system was developed by the consolidation in 1912 of various existing lines and the subsequent construction of extensions reaching almost all the important cities and centres of production and population in the two countries. It reaches the protected harbors of Puerto Barrios on the Caribbean and Cutuco (La Union) on the Bay of Amapala on the Pacific; also the ports of San José and Champerico on the Pacific Coast of Guatemala which are, however, open roadsteads. It permits connection at Ayutla on the border of Mexico with the National Railways of Mexico.

The earnings for the first nine months of 1929 showed an increase of about $300,000 in gross over 1928. Net earnings, after taxes exceeded three million dollars in 1928 and have grown steadily each year.

The United Fruit Company has one of its most extensive plantations of bananas along the first 60 miles of the railway westerly from Puerto Barrios and ships some 6,000,000 stems annually over the lines of the railway; about 1,000,000 stems are also shipped from the Pacific side to California. The principal product of the countries, however is coffee, of which about 50,000 tons are produced annually in Guatemala and approximately the same amount in Salvador. The larger part of this is shipped to New Orleans, New York and Europe. FRED LAVIS.

New Zealand

The problem of a rising deficit continues to confront the management of the New Zealand Government Railways. Mainly because of increased interest charges attending higher construction costs, these lines have failed to report a surplus since the year ending March 31, 1926. As is the case in other countries passenger traffic continues to decline because of private automobile and common carrier motor coach competition. Freight traffic, however, is growing at a moderate rate and the increase in revenue from this latter source during 1928-29 was eight times as great as the loss in passenger revenues. Thus total revenues tend upward but expenses grow at a comparable rate and, with but slight fluctuations from year to year, recent net revenues have remained fairly constant. It is, therefore, the 21.3 per cent increase in interest charges since 1925-26 which accounts for the mounting deficit.

To check the diversion of its passenger revenues these railways have entered the motor coach field. While these highway services were operated at a loss during the past fiscal year there was an offsetting figure for train operating expenses saved through substitutions. This substantially reduced the deficit in the motor coach accounts. The department has under way a general program for the improvement of its rolling stock. Such improvements in passenger cars it is hoped will aid in attracting passengers to the trains. Included in this equipment rehabilitation program was a plan for the reorganization and modernization of shop facilities. One of the salient features of this latter, now completed, is the centralization of heavier repair work to prevent uneconomical duplication of expensive facilities. The deficit of recent years caused the general manager in his 1928-29 report to comment at length on the desirability for "commercialization" of the railways, i. e., the separation of their accounts from the national budget and the minimization of political influence through some such plan of management as has been adopted for the Canadian National.

Australia

Australia, with an area of 2,974,581 sq. mi. and a population of 6,500,000, completed the financial year ended June 30, 1929, with an aggregate railway route mileage of 26,512. Notwithstanding adverse seasonal conditions during the greater part of the year, earnings totalled £48,891,703, ($238,102,600), and, while this amount is not sufficient to fully meet interest obligations, it must be remembered that Australia is in the developmental stage. At least half the mileage constructed has been built ahead of settlement to open up the great wool, wheat and beef producing areas of the country, and these lines are built with the full knowledge that they cannot be expected to pay for quite a

number of years. Moreover, to foster primary production, materials used on the farm and the produce therefrom are carried at extremely low rates and the fact that one system alone refunded to farmers and graziers in the form of rebates on starving stock and fodder for starving stock no less a sum than £1,200,000 over a period of ten years is indicative of the concessions made to develop primary industries.

In common with other countries, the highway vehicle, commercial and passenger, has had a serious effect on railway revenues, and now well organized air lines between the principal cities are adding to the difficulties of the railway managements. On a number of systems, to meet this competition, schedules have been speeded up, coaches have been made more comfortable, and buffet cars have been introduced. In Sydney and Melbourne the whole of the suburban services, radiating to points over twenty miles from the cities, have been electrified and the fast schedules provided have regained much of the traffic previously taken by the motor coach. On the main trunk routes involving night journeys the trains are extremely comfortable and the rates for sleeping accommodations compared with those obtaining over seas are very low.

That there is no ground for pessimism as to the future of the railways of Australia is evidenced by the fact that new capital to the extent of £11,500,000 ($56,005,000), was spent for the year under review, in the construction of 293 additional miles of line, provision of additional workshops and structures, and additions to rolling stock, including larger capacity freight cars and locomotives with tractive effort up to 56,000 lb. Australia's greatest need is the expansion of her secondary industries at a pace more commensurate with the expenditure necessary for primary development, and the customs tariffs adopted in recent years have assisted industry to such an extent that the railways may look forward with every confidence to a steady growth in the business which they are called upon to handle. S. NICHOLAS.

China

In general, it may be stated that all the railroads of the Chinese Republic are well maintained, as far as ballasting and up-keep of structures are concerned; but (solely because of lack of funds) the ties are in bad condition, some of the rails are considerably worn, and the rolling stock is both scarce and out of repair. The main cause of all the trouble is military interference with operation and ruthless destruction of track and structures by warring factions. Moreover, the military leaders for nearly a decade have been making a practice of appropriating the receipts of the railroads in an outrageously bold-faced manner. During their occupation of a line, no money at all is spent for up-keep, and the rolling stock is so carelessly handled that cars are smashed and locomotives are ruined, or at least put out of commission. Just as soon, though, as a line is restored to civil control, the damaged bridges, tunnels, and track are quickly, intelligently, and economically repaired, and train service is resumed; but the reconstruction of the rolling stock is necessarily a slow process.

Owing to the lack of new ties and the rotten condition of most of the old ones, it is necessary to operate trains at slow speed, thus greatly reducing income. This condition has forced the management to increase freight rates often to such an extent as to make transportation of certain goods impracticable, thus again lowering the gross income by reduction in volume of traffic. As for the passenger business, that is fairly steady because people may be relied upon to travel, even under greatly adverse conditions; but, unfortunately, when the state of the road is upset, many "deadheads" are hauled because of *force majeure*. They crowd into the cars and refuse to pay fare. This has necessitated a peculiar practice, viz., having the ticket-collector accompanied by two or three armed guards.

But there is a brighter side of the picture, because each Chinese railroad is either an actual or a potential little gold mine on account of the vast population that it serves, as well as the fact that the net income, under normal conditions, generally exceeds 50 per cent of the gross. What Chinese railroads most need today is foreign capital—and plenty of it—in order to put the existing lines into proper shape for carrying full loads at an economically high speed, to build some direly-needed new main lines, and to construct a system of highways to serve as feeders. If the present worthy but greatly obstructed National Government be permitted to continue to function, and if the constantly-occurring uprisings should cease, or be reduced reasonably near to zero, the future transportation of China would be assured; for the government is planning wide-spread reconstruction of existing lines, several new railroads, the building of a fine system of highways, some serviceable aeroplane transportation, and many other fundamental improvements. J. A. L. WADDELL.

India

Railways of India have shown remarkable progress since 1921 when they were in a state of practical insolvency. In the fiscal year 1921-22 Indian lines as a whole failed by approximately $34,090,000 to meet their interest charges. From that time, however, until March, 1929, credits to profit and loss of the state-owned lines have totaled $194,800,000, of which about $73,050,000 is now carried in the Railway Reserve Fund and $48,700,000 in a depreciation reserve. During the year ending March 31, 1928, the latest fiscal period for which complete figures are available, the gross revenues of all Indian railways were equivalent to $437,420,000; operating expenses were $267,501,000, and composite net earnings $169,919,000. The operating ratio was 61.16.

Of the 41,000 miles of railway in India, approximately 30,000 miles are owned by the state and 18,000 miles are managed directly by the Indian Railway Board. Segregating the state operated and controlled lines, the latest report reveals that these government properties on March 31, 1928, involved a total capital cost of $2,696,849,000; they reported $375,479,600 of the total $437,420,000 gross 1927-28 revenues of all roads and earned $145,707,000 of the $169,919,000 total net. For statistical purposes the railways are grouped according to their annual gross revenues. There are three classes. Class I roads are those with annual gross revenues of 50,000,000 rupees ($18,500,000); Class II lines are those reporting less than 50,000,000 but more than 10,000,000 rupees ($3,700,000) and all others are of Class III. Class I roads account for approximately 96 per cent of the country's annual gross railway revenues, reporting $423,152,700 of the aggregate $437,420,000 in 1927-28.

Although there is a lack of uniformity in gage on Indian railways the problem is not a particularly serious one. The 5 ft. 6 in. and the meter gage lines account for 90 per cent of the mileage. Generally speaking these two principal gages serve different areas and prac-

tically all important centers are connected by the broad gage lines. Neither is highway competition yet a serious problem for the railways as a whole. The lack of good roads has retarded motor transport development. At several centers surrounded by suitable highways, however, motor coaches are attracting passengers from the railways. The railways, on the other hand, are taking steps to meet this present and potential highway competition by improved services and reduced fares. In some instances steam rail cars have been introduced. These latter make regular stops at village highway crossings and thus furnish a service comparable in convenience to that of motor coaches which usually stop at several points in each population center. These rail car services have not only checked the diversion of passengers but have stimulated new local traffic.

An extension of electrification is planned on a large scale in the near future, especially on suburban lines surrounding the larger cities. On November 5 the Great Indian Peninsula Railway opened for electric operation 86 miles of its main line between Kalyan Junction and Poona. This is part of a projected electrification program involving 200 route miles of the G. I. P. Extensive terminal improvements are also planned to meet the transport needs of such growing cities as Bombay, Madras and Calcutta. Finally, among other important recent devolpments, are the segregation of the railway accounts from the general budget, the improved operating efficiency, the extension of employee training activities and the inauguration of an aggressive railway publicity policy.

Africa

Because of the generally undeveloped nature of the continent, railway interest in Africa is still focused largely on the extension of existing lines or on new construction designed to connect such lines with each other and with points still lacking railroad facilities.

In the Union of South Africa, the government railways have opened over 600 miles of new line since 1925; approximately 400 miles were still under construction in 1929, and work was begun in that year on additional sections totaling 96 miles. The opening, on August 31, of the Alfred Beit Memorial bridge, spanning the Limpopo river, marked the completion of the most difficult part of a new line between the South African railhead at Messina (Transvaal) and the railways of Southern Rhodesia.

In western Africa, the Benguela Railway was completed from Lobito Bay, on the coast of Angola (Portugese West Africa), to Luao, on the border the Belgian Congo, 836 miles. Work was also begun on the Belgian end of the project, from Luao to the Katanga Railway at Tshilongo. When completed, the new line will provide the shortest export route for the Katanga copper mines, and will also form part of the first transcontinental route in Africa. In the east, a branch to the Iramba plateau from the Tanganyika Railway was authorized, as were extensions of the Kenya & Uganda Railways from their present inland terminus at Jinja and branches to the Kericho and Sotik areas.

As regards operation, the South African Railways reported earnings of £26,090,712 ($126,800,860) for the fiscal year ending March 31, 1929, an increase of £785,891 over the previous year. Expenses increased only £98,656, to a total of £20,298,664 ($98,651,507), so that there was a net surplus for the year, even after capital charges. After reaching a record total of 81,994,517 passengers carried in 1928-1929, passenger traffic declined slightly during the remainder of 1929, Freight traffic, however, increased, and operating expenses increased less than revenue during the spring and summer.

Although figures for most of the other African lines are available only through 1928, similar trends seem to have prevailed elsewhere, with revenues growing more or less steadily and with expenses generally being held low enough to allow satisfactory balances with which to meet fixed charges.

Motor competition is as important in Africa as elsewhere in the world, with the difference that it competes not only with existing lines but with proposed lines whenever the best means of opening up new territory are discussed.

The Type of Freight Car Now Being Built in Poland for the Polish State Railroad

NEWS *of the* WEEK

Detroit Union Produce Terminal, served by Pere Marquette, Pennsylvania and Detroit, Toledo & Ironton

COMMISSIONER J. B. CAMPBELL of the Interstate Commerce Commission has resigned to return to the practice of law.

THE FEDERAL TRADE COMMISSION has issued a formal complaint against the Mechanical Manufacturing Company, which is controlled by the principal stockholders of Swift & Company charging unfair methods of competition in inducing and compelling railways to purchase draft gear and other equipment from it by promises and assurances of freight traffic to be shipped by Swift & Company or by threats of withdrawal of freight traffic if they would not. The complaint also names as defendants the manager and assistant manager of the Swift traffic department. The defendants are required to answer to the complaint or appear at a hearing in Washington on January 10.

Letter Ballot Returns

The returns from eight letter ballots submitted to the members of the American Railway Association, Mechanical division, as a result of the action of the division at its 1929 annual meeting in Los Angeles, Cal., were announced by the secretary in circulars dated November 30, as follows:

Brakes and Brake Equipment.—The committee on this subject recommended a type of auxiliary-reservoir release valve which, as a result of the favorable letter ballot, is approved as standard and recommended practice, effective March 1, 1930.

Couplers and draft gears.—The committee on this subject recommended a modified design of toggle for bottom-operated Type D couplers which, as a result of the favorable letter ballot, is adopted as a standard and recommended practice, effective March 1, 1930.

Wheels.—The committee on this subject recommended a journal length gage and a master gage for checking standard A. R. A. wheel-defect gages which, as a result of the favorable letter ballot, are adopted as standard and recommended practice, effective March 1, 1930.

Loading Rules.—The committee on this subject divided its recommendations into 22 propositions for modification of the A. R. A. loading rules, all of these propositions, as a result of the favorable letter ballot, being approved, effective January 1, 1930.

Lubrication of Cars.—The recommendations of the committee on this subject were divided into four propositions for modification of the standard method of packing journal boxes, for adoption of standard specifications for dust guards, for the revision of standard specifications for new journal box packing waste and for the adoption of specifications for new car oil. All of these propositions, as a result of the favorable letter ballot, are approved, effective March 1, 1930.

Car Construction.—The recommendations of the committee on this subject were divided into five propositions for the revision of standard specifications for journal-box lids, standard lettering and marking of cars, classification and lettering of cars, arch bar column and journal box bolts and column castings, and the adoption of minimum dimensions from top of rail to bottom of truck side frames. All of these propositions, as a result of the favorable letter ballot, are approved, effective March 1, 1930.

Locomotive Design and Construction.—The committee on this subject divided its recommendations into five propositions for the design of various locomotive details, including crossheads and guides, bronze rings between main rod sides and crossheads, back cylinder heads, side rod knuckle joints and tender-tank hose. In addition, one proposition was advanced to adopt as recommended practice specifications for tender tank hose. Another suggested a formula for computing the tractive force of locomotive boosters. All of these propositions are approved as a result of the favorable letter ballot, effective March 1, 1930.

Specifications and Tests for Materials.—The recommendations of the committee on this subject were divided into four propositions for the revision of standard specifications for air-brake hose gaskets, cast-steel truck side frames, truck bolsters and coupler yokes. Five new specifications were prepared for normalized and drawn carbon-steel forgings and alloy-steel material for several specialized uses in the construction of nitric-acid tank cars. All of these propositions, as a result of the favorable letter ballot, are approved, effective March 1, 1930.

Equipment

THE SOUTHERN PACIFIC is inquiring for 10 baggage cars, five dining cars and five lounge cars.

THE MISSOURI PACIFIC has ordered four steel dining and parlor cars, 70 ft. long, from the American Car & Foundry Company.

THE BIRMINGHAM SOUTHERN has ordered 25 box cars of 50 tons' capacity from the Pullman Car & Manufacturing Corporation.

THE CHICAGO GREAT WESTERN has ordered 15 locomotives of the 2-10-4 type from the Lima Locomotive Works. Inquiry for this equipment was reported in the *Railway Age* of December 14.

Inquiries for $42,500,000 of Equipment

The Chesapeake & Ohio, Pere Marquette and Hocking Valley budgets for 1930 have been authorized and inquiries have been issued calling for the purchase of equipment to cost about $42,500,000 as follows:

CHESAPEAKE & OHIO

25	freight locomotives
50	switching locomotives
40	large tenders
2000	box cars of 50 tons capacity
1500	gondola cars of 57½ tons capacity
1500	hopper cars of 70 tons capacity
20	passenger and baggage cars
41	passenger cars
6	mail and express cars

PERE MARQUETTE

15	switching locomotives
15	large tenders
1500	box cars of 50 tons capacity
2000	automobile cars of 40 tons capacity
250	automobile furniture cars of 40 tons capacity
750	high side gondola cars of 57½ tons capacity
250	low side gondola cars of 70 tons capacity
100	flat cars of 50 tons capacity
25	caboose cars
8	passenger cars
12	baggage and express cars

HOCKING VALLEY

25	freight locomotives
15	switching locomotives
1500	gondola cars of 57½ tons capacity
4	passenger cars

Specifications are being prepared by

the Erie and the New York, Chicago & St. Louis for their equipment requirements.

Railway Officers

R. C. Morse, general superintendent of the New York Zone of the Pennsylvania, with headquarters in New York City, has been appointed assistant general manager of that zone, with the same headquarters.

J. C. Cumming and **E. A. Klippel, Jr.,** have been appointed assistant general passenger agents of the Union Pacific System, with headquarters at Portland, Ore. Mr. Cumming succeeds **A. C. Martin,** who has retired. **Burton Beck** has been appointed general agent, passenger department, with headquarters at Portland, succeeding Mr. Klippel.

John B. Kerr has retired as president of the New York, Ontario & Western, effective January 1. He will be succeeded by **Joseph H. Nuelle,** formerly vice-president and general manager. **R. D. Rickard,** vice-president, secretary and treasurer of the road has also retired. He will be succeeded as treasurer by **Arthur L. Parmelee,** assistant treasurer. **Charles E. Simmons** has been appointed secretary. **C. A. Draper,** purchasing agent, has also retired, effective January 1.

Colonel John S. Dennis, chief commissioner of colonization and development of the Canadian Pacific, with headquarters at Montreal, Que., has retired from the service of that road after having served 29 years with the company. It was announced that the colonization and development department would now be divided into two departments to be designated as the department of immigration and colonization headed by **J. N. K. Macalister,** formerly assistant chief commissioner of colonization and development, the department of development, under **Major G. G. Ommaney.**

Harold R. German, who has been appointed assistant to the president of the Lehigh Valley, with headquarters in New York City, was born in New Hartford (Utica) N. Y. He entered railway service as stenographer in 1907 with the Delaware, Lackawanna & Western, subsequently serving as secretary to the vice-president of the same road. In 1917 he was appointed secretary to the president of the Lehigh Valley and the following year he became assistant secretary of the same road, the position he held at the time of his recent promotion to assistant to the president.

W. O. Lewis, district freight agent of the Gulf, Mobile & Northern at St. Louis, Mo., has been appointed assistant freight traffic manager with headquarters at New Orleans, La. **L. L. Lapp** has been appointed division freight agent, with headquarters at Jackson, Miss., with jurisdiction over Jackson and Meridian, Miss. **R. L. Lichty** has been appointed district freight agent at Kansas City, Mo. and **J. S. Chartrand** has been appointed to a similar position with headquarters at St. Louis, Mo., succeeding Mr. Lewis. The position of eastern freight agent has been abolished and **E. W. Goslee,** who formerly held that position, has been appointed general eastern agent, with headquarters in New York.

Charles R. Painter, assistant to the vice-president of the New York, New Haven & Hartford, has been appointed purchasing agent, with headquarters at New Haven. Mr. Painter was born in July, 1887, at Muncy, Pa. He was educated in the high school in that city and Williamsport Commercial College, and entered railway service with the Buffalo & Susquehanna at Austin, Pa., in 1905. Three years later he entered the service of the Atchison, Topeka & Santa Fe, where he was employed in

Charles R. Painter

various clerical positions in the mechanical department at La Junta, Colo., and Dodge City, Kans. In November, 1917, he became chief clerk to the general storekeeper of the New York, New Haven & Hartford at New Haven, Conn. In May, 1918, he was promoted to the position of chief clerk to the purchasing agent and in June, 1922, he became assistant to the general purchasing agent. Three years later he was appointed assistant to the vice-president in charge of purchases and stores, which position he held at the time of his recent appointment as purchasing agent.

Ben C. Dey, general attorney of the Southern Pacific at Portland, Ore., has been promoted to general counsel of the system, with headquarters at New York, succeeding **Joseph P. Blair,** who retires from active service under the pension rules of the company on December 31. **A. A. Hampson,** who has been connected with the Southern Pacific legal department as a member of the law firm of Dey, Hampson & Nelson at Portland, has been appointed general attorney for the lines in Oregon succeeding Mr. Dey. Mr. Dey, whose appointment became effective on January 1, was born on a farm near Oregon City, Ore. He attended public school in that vicinity and at Santa Cruz, Cal., graduating from the Portland high

Ben C. Dey

school in 1900. In 1905 he graduated from the law department of Leland Stanford University, starting the practice of law on January 1, 1906, in the office of the counsel for the Southern Pacific in Oregon. Ten years later, on July 1, 1916, he was promoted to general attorney for the lines in Oregon. Mr. Dey is also senior partner of the law firm of Dey, Hampson & Nelson of Portland.

Mr. Blair, who retires as general counsel after 45 years of service with the Southern Pacific lines, was born on December 5, 1859, at Columbus, Miss.

Joseph P. Blair

He graduated from the University of Virginia in 1881 and was admitted to the bar in Louisiana in 1883, and then began the practice of law at New Orleans, La., as a member of the firm of Leovy & Blair. His connection with the legal department of the Southern Pacific began in 1884 on the Louisiana lines and in 1895 he was appointed general counsel of those lines. On the latter date he also became a member of the law firm of Denegre & Blair, an affiliation which was continued until November 1, 1913, when he was promoted to general counsel of the company, with headquarters at New York. Mr. Blair has occupied that position continuously since that time.